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FIRST STEPS IN MENTAL GROWTH



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FIRST STEPS IN MENTAL GROWTH

A SERIES OF
STUDIES IN THE PSYCHOLOGY OF INFANCY

BY

DAVID R. MAJOR, PH. D.

PROFESSOR OF EDUCATION IN THE OHIO STATE UNIVERSITY

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FIRST STEPS IN MENTAL GROWTH

PREFACE

THE *Studies* composing this volume are based, in the main, upon a record which I kept of my child R. from his birth to the end of his third year, and they are made up in large measure of transcripts from my note-books.

The principal aim of the *Studies* is to present data, observational and experimental, bearing upon certain aspects of infant mind which have a special attraction for me, mainly because they seem to be fundamental to later mental development; also for the reason that in studying them one is carried back to the rudimentary processes from which spring the leading characteristics of the developed mind. My original plan was to make notes as full as time would permit and as accurate as possible, and then to print the bare record. But this plan was abandoned for two reasons: first, it was found that additional explanation was necessary to make the record intelligible. In the second place, one cannot undertake the arrangement of material of this kind without thinking about it, without wondering what it means, why and how it came to be what it is, what were the conditions of its appearance, what are its inter-relations, and what its relation to later mental development.

Occasional and meager attempts to answer some of these questions — which, if answered in full, would constitute a complete theory of mental development in the individual — have found a place in the book. But whatever interest or value the work may have must lie, mainly, in the record stripped of all theory and interpretation beyond what has been absolutely necessary for the presentation of a faithful narrative, which is the leading purpose of the undertaking. Whatever the value of my interpretation, I hope it will be found that the record of my observations and experiments rings true.

It will be inferred from what has been said already that the work makes no pretension to being a complete treatise on the "Psychology of Infancy"; much less does it profess to be a work on "Genetic Psychology." It professes only to be a presentation of empirical data carefully observed and accurately recorded regarding some important phases of infant activity. I hope that the data thus furnished will be of use to psychologists who may be engaged in the formulation of a theory of mental development. I hope, also, that besides the psychologists and others having a scientific interest in the processes of mental development, the *Studies* will prove of interest to parents and teachers whose attitude toward infancy and early childhood is primarily ethical and practical, and that they may be suggestive — first, as to the kinds of things which should be observed, what

are really significant; and second, as to the methods of observation which are likely to yield results which are worth while.

During R.'s first twenty months he was an only child in a small family of adults. The advantages of having as the subject for one's observations an only child are obvious enough. The disadvantage is that a child thus isolated from his kind probably falls short of being a typical child. Still, this disadvantage tells more strongly in later childhood than in infancy and early childhood.

In the preparation of the *Studies*, I have received much assistance from Preyer's pioneer work, "The Mind of the Child" (English translation, in two volumes, by Professor H. W. Brown); Professor Sully's "Studies of Childhood"; Miss Shinn's "Notes on the Development of a Child," and her delightful volume, "The Biography of a Baby"; and Professor Baldwin's "Mental Development in the Child and the Race." I have also consulted a large number of books and articles on special points, and acknowledgment of the help received from them is made in footnotes and references throughout the work.

It is a pleasure to acknowledge the invaluable service rendered by my colleague, Dr. A. E. Davies, in revising the work in manuscript. I have further to thank Professors E. B. Titchener and G. M. Whipple of Cornell University, who read critically the greater part of the book in manuscript, for many valuable sugges-

tions; and my wife for constant help in making the observations reported in the *Studies*, and in correcting the proofs.

DAVID R. MAJOR.

THE OHIO STATE UNIVERSITY, Columbus.

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First Steps in Mental Growth

CHAPTER I

INTRODUCTION

IT is a truism that since the appearance of the *Origin of Species* the application of the evolutionary hypothesis to the interpretation and illumination of the problems of human thought and conduct has been widened until now no field of inquiry escapes its influence. And it is not too much to say that the greater part of the scientific work of the last half century has been done under the stimulus of Darwin and of the conceptions and methods which he developed and illustrated. Modern science is concerned primarily with the historical and genetic aspects of phenomena, with their origin and the order of their development. The astronomer, *e. g.*, asks how a solar system originates, and what are the forces operative in its development; the biologist wishes to know the primitive organisms from which spring the more highly developed forms of plant and animal life; the historian and sociologist study the life and institutions of primitive peoples in search of the origin of the customs and usages which are fundamental in social groups.

The same kind of curiosity which impels the astronomer, the biologist, and the sociologist to search out the primitive forms in their respective fields, prompts also to the study of the ways of infancy; particularly, to the effort to bring to light the germinal processes from which spring the characteristic activities of the developed mind. Accordingly, we have witnessed, in comparatively recent years, the rise of a wide-spread interest in the psychology of infancy. A few investigators, notably Darwin, have been attracted to the study of the infant mind through reflection on the physical and mental relations of man to the lower animals. Preyer began his study of the child, as he says in his preface, "from the physiological point of view, with the object of arriving at an explanation of the origin of the separate vital processes." Later, Preyer divided his work into three parts: (1) life in the embryo, (2) the physical development of the newly born and the very young child, (3) mental development in infancy and early childhood. Preyer's interest, at first, was in the phenomena of physical development, and his work, *Die Seele des Kindes*, though rich in the data of child psychology, has — from the psychological point of view — the defects of a work written by one who was physiologist rather than psychologist.

A larger number of students of infancy and early childhood have been interested primarily in the phenomena of

mental development — in a word, have been psychologists, who believe that if they can discover the first buddings, the first, tentative shootings-forth of the baby's mind, they will know better the nature of the developed mind — its essential processes and their relationships, their fusions and correlations.

Besides the naturalists and the psychologists, whose chief concern is to *know* the child mind, a still larger number of students — chiefly parents and teachers — are attracted to child psychology for practical and moral reasons. As Sully observes: — “The modern world, while erecting the child into an object of æsthetic contemplation, while bringing to bear on him the bull's-eye lamp of scientific observation, has become sorely troubled about the momentous problem of rearing him.” Parents and teachers “have come to see that a clear insight into child-nature and its spontaneous movements, must precede any intelligent attempt to work beneficially upon this nature.”¹ To be sure, the chief concern at first, particularly of the mother, is the baby's physical well-being — the basis of normal moral and intellectual development — and to that she will devote her best energies. But since education begins at the cradle — some one has said, “heredity really begins at the cradle” — the parent will wish to understand the characteristics of the baby's mind

¹ Sully, *Studies of Childhood*, New York, 1896, p. 10.

as well as those of his body. No doubt every properly constituted parent is interested in such important events as the appearance of the first tooth ; he will ask when the stubby, mere appendage-like legs will catch up with the long body ; and he will be curious to know when the ludicrous asymmetrical performances of the two eyes will disappear, and many more similar things pertaining to the physical development of the child. And he will be interested in the rise and development of such psychophysical processes as standing alone, learning the " bye bye " salutation, the beginnings of speech and the like. He will have reason also to watch the more mental processes like fear, anger, imitation, memory. And I cannot but think that thus to study the child will result in better methods of training than to follow the lead of blind instinct or unreflecting rule-of-thumb methods. Moreover, I have no sympathy with the superstition that the desire to understand is at war with the normal growth of parental affection and tender regard, any more than I believe that the desire to know nature's ways in the physical world interferes with one's aesthetic appreciation and delight in the wonders of earth and sky.

What interest can a teacher have in the ways of infancy ? One may say, " I see the ground for the interest which a parent might have in a study of infant activities, but what is the profit for teachers, who (excepting those in the kindergartens) are concerned with children well past

the period of infancy?" This may be answered in a word. It is a commonplace of our thinking that what a thing is cannot be known unless one knows what it was like formerly, what were the conditions which preceded and from which it arose. So of the mental processes of the child at school: in order to know what they are like now, we must know what they were like primitively, in their rudimentary forms. And since it is impossible for the teacher to know the infancy of all her pupils, the next best thing is to know the leading traits of the infant mind in general, its native tendencies, impulses, capacities, activities. To change slightly James' well known definition of teaching—"The teacher's art consists in grafting complications on native reactions, or in bringing about a change in the nature of the reaction which given situations originally tend to provoke. And success in the art presupposes a sympathetic acquaintance with the reactive tendencies natively there." . . . "The first thing then for the teacher to understand," James writes in a later paragraph of the same work, "is the native reactive tendencies—the impulses and instincts of childhood—so as to be able to substitute one for another, and turn them on to artificial objects."¹ Dewey expresses the same thought as follows:—"All conduct springs ultimately and radically out of native instincts and impulses. We

¹ *Talks on Psychology*, New York, 1899, pp. 38, 43.

must know what these native instincts and impulses are, and what they are at each particular stage of the child's development, in order to know what to appeal to and what to build upon."¹ The quotations from James and Dewey state, in brief, the ground for the belief that teachers will derive benefit from a study of the ways of infancy.

I have spoken of some of the reasons which have led scientists and educators to the study of child mind, and of some of the benefits and advantages which may be derived from such study. It may not be out of place to speak next of the conditions and difficulties of observation in the field of child psychology. The condition of successful observation is substantially the same as in other fields; namely, an open mind well stored with knowledge about the phenomena under consideration. One must know what to look for, what is significant and essential, and what is trivial and accidental; and one must be willing to see what is actually there. One needs, also, a certain blending of imaginative insight with reserve and caution when making a record of infants' ways. It is difficult to tell the exact truth even about so simple a thing as the baby's grasp of a pencil, or the first crowing and babbling. The phenomena of child life are so elusive, even on the physical side, as to require the

¹ *Third Year-Book of the Herbart Society*, Chicago, 1897, p. 27.

highly sensitized photographic plate to catch what actually happens, and ordinary language is too clumsy an instrument for adequate description. And this leads me to speak next of the difficulties and dangers which beset the scientific study of childhood and infancy.

One snare which marks the way of the student of infant ways is the desire to fix with exactness the dates of the first appearance of given abilities or functions. The search for beginnings, the absolutely first appearance of definite processes like turning the head when looking for the source of a sound, reaching for objects and grasping, anger, fear, imaging, recognizing and the like will always end in failure for the reason that there are no complete breaks in the chain of experience which warrant one in saying, "at that moment the child could *not* do so and so, at the next he could."¹ And when one

¹ During a period of three and a half years of pretty constant watching of my own two children, I saw only one acquired ability which had the appearance of coming "all at once," and that was the child J.'s creeping on hands and knees, which I first noticed on the first day of his second year. The child's first method of getting about the room was to lie flat on his stomach, extend his arms in front of him, and then pull himself forward by the fore-arms and elbows, the hands playing only a small part in the movement. This method of creeping began near the middle of the eleventh month, and continued to the end of the first year. During the forenoon of the first day of the second year, I saw the child creeping in the usual way, *i. e.*, lying flat on his stomach and pulling himself forward by his arms. In the afternoon of the same day, I saw him lean forward from a sitting position to his hands and knees, and creep a distance of two feet. From that time, I never saw him use the first method of getting

attempts to fix the date of the appearance of a particular kind of mental activity, the difficulty is increased by the fact that in infancy mental processes are so intricately interwoven with organic, semi-conscious phenomena that the dawn of a particular kind of consciousness cannot be determined. We have seen a bed of plants whose stems above ground stood apart from the stems of the neighbouring plants, and we have thought it not impossible to trace to their remotest ends the roots of the individual plants. But when we dig beneath the surface, we may find that the stems above ground have sprung from a common root-stock, or that the roots have grown together and form a mass, an inextricable net-work of rootlets so that the search for the roots of a particular plant is in vain. The child's several abilities and functions arise out of a net-work of instinctive tendencies which may be likened to the intertwined and tangled rootlets from which spring the separate plant stems. In both cases,

about the room, and the new method of creeping on hands and knees developed rapidly, so that the note for the eighth day of the second year reads, "The child creeps everywhere about the house on his hands and knees, and with evident enjoyment. He seems eager to creep, does not want to be held on one's lap, wants to creep just for the fun of creeping." This, as was said, was the only acquired ability noted which was not slowly developed by practice. And in this case, one cannot be sure that there was not preliminary practice in resting on the hands and knees which escaped our notice — for instance, moving about when he was in his crib after his nap was over, and before he made an outcry to let us know that he was ready to be taken up.

search for beginnings — in the strict sense of that term — is futile.

We have just seen that one is likely to be disappointed if one searches for the first beginnings, the first appearances of particular kinds of child activity. We have next to observe that there are no sudden leaps in the various phases of the developmental process after they have once begun. Indeed, the one thing which, for the writer, stands out more prominently than any other, as a result of the observations recorded in these *Studies*, is the fact that the child acquires his various abilities by slow, almost imperceptible steps. He is possessed of a vast number of native instincts or impulses, and these make their appearance by infinitesimal steps or degrees. For example, the instincts to reach and grasp, to imitate, to walk, to talk — all come to perfection gradually. To be sure, the process is more rapid in some lines than in others ; but in the most rapid there are no absolute breaks which warrant one in saying, "at this moment a child lacks a certain ability, the next he has it." Hence, when it is said that an ability or function seemed to burst forth of a sudden, it should be remembered that it was only seeming and not actual. Of course, in this general statement one excepts such organic reflex actions as clasping with the fingers, sucking, and a few others which are well developed — though rarely perfect — at birth.

Another impression which is constantly borne in upon

one is that an account of infant activities which analyzes whole pieces of conduct, which isolates and detaches elements or factors of a total experience for purposes of description, is likely to result in disfigurement rather than in accurate picturing and explanation of the piece of conduct thus analyzed. An important principle of modern scientific method is that if one would know the real nature and meaning of a phenomenon, one must see it in its complete setting, and conversely that a process of detaching and isolating inevitably gives a partial and imperfect notion of the phenomenon thus detached from its natural setting. Accordingly one finds a number of writers on the psychology of child development—Dewey, Sully, and King, for example—laying much emphasis on wholeness of view as a necessary condition of the right understanding of child conduct. Thus King in the Preface to his *The Psychology of Child Development* writes, “These pages emphasize the point that the attempt to study isolated elements of the child’s life is radically unscientific; that we must have as nearly as possible the *complete setting* of an act before we are entitled to say what it is or what it means.” And again on a later page King writes, “We can only say of the process in hand that it arises in such a situation and performs a certain function. We thus do not do it the violence of trying to label it according to its most prominent characteristic, ignoring the others as mere ap-

purtenances that it were really better to lop off in order to get at the real, the essential content. . . . The state itself is a unit, and must be treated so; its complexity can be defined only on the side of its use in the entire activity.”¹

The correctness of the point of view indicated by the quotations from King, no one who lays his “faculty” psychology on the shelf and gives himself to the observation of a child’s ways will be likely to question. If one

¹ How important it is to take account of all the conditions surrounding an action, how liable one is to go astray in interpreting a bit of child conduct may be illustrated by a paragraph from my note-book, as follows: One day when R. was a little past his tenth month I was holding him in my lap as I sat at my study-table. Suddenly, the child reached over, pulled open the table-drawer, and began to pull out papers, pencils, boxes of pens, stamp boxes and other miscellany scattered about in the drawer. At first thought, one might have said — in fact a by-stander did say — “the child pulled the drawer open to get the articles in the drawer.” But when the complete setting is given, one gets a much simpler explanation, and, no doubt, the true one. In the first place, the knob had a bright brass ornament which attracted the child’s attention, and which he reached for and seized. When he seized the knob, naturally he pulled and the drawer came open. In pulling the drawer nearer him, he lost sight of the knob with its bright ornament. Moreover, the array of new things in the open drawer caught his eye, and he began at once to pick them up, pull them from the drawer, and scatter them on the table and about the room on the floor. Thus instead of attributing memory, judgment, purposiveness to the child in order to explain his pulling the drawer open, one needs only the instinct to reach for and seize objects which are within reach; and that impulse at that time was strong. For another illustration of the principle that correct interpretation requires that one know the complete setting, see Chapter VI on *Color*, especially page 148 following; also Baldwin, *Mental Development*, Vol. I, p. 39ff.

attempts to find definite, elementary, mental processes like willing, remembering, and the like, and uses such terms to describe concrete bits of infant activity he will surely miss the wood among the trees, and what is worse he will see trees where there is only a tangle of under-brush. And yet, while one wishes to lay stress upon the importance of keeping constantly in mind that wholeness of view is a necessary condition of truthful interpretation, one remembers, on the other hand, that description involves a process of analysis. The situation is a complex, and one cannot say everything at once. It is just as futile to sit and gaze pensively at the whole of a piece of conduct as it is apt to be misleading to detach its elements for closer scrutiny. It is necessary to see that the wood is made up of trees, and it is necessary that we know the trees if we would know the wood. To drop the figure, one does not search for elements of child activity merely for the purpose of "psychologizing" that activity. The process of resolving a complex situation, of rendering its meaning clear, of getting at its significance involves a description of the elements entering into the complex. The only question is—are the elements there, and do they exist in the way they are said to exist? The latter question settled, settles also the question as to what shall be done about the elements.¹

¹The truth of the matter is, of course, that both points of view are required; and it is also true that the view-point maintained by King in

The attempt to classify infant activities is beset with many difficulties. The usual method has been to class them according to some one phase or aspect which happened to strike the observer's eye. Very often the least significant feature of the activity has determined the classification. In any event, the grouping under selected captions is arbitrary. Almost any piece of conduct of a child one year old might, with good reason, be classed under any one of a half dozen headings. To illustrate: in order to entertain the child one hands him his box of cubes. He at once begins to play with them, throws them, "feels" them, turns them over in his hands, looks at them, piles them on top of one another. How shall we class the activity? As memory, recognition, will, play, hand-movement, imitation, constructive impulse, suggestion, joy? Each of them is present at some stage of the play with the blocks. Or, when older, the child sees on a shelf a bright toy which he recognizes and wants, and proceeds to pile one box on top of another in order to climb up and get the toy. At first, one would say, "an act of will," a purposive action. But analysis brings to light memory, imagination, feeling aspects, ideo-motor action — what not. Of course, objection to this method is lessened when the total situation is represented in the account. When one makes sure particular has been practically overlooked, and his service in giving it strong emphasis must be gratefully acknowledged.

that the class name does not obscure other essential features of an action, when enough is stated to give a complete picture of the action, the objection to this or that label is lessened. For it really matters little whether an action, a piece of conduct is called a, b, c, x or y. The more important concern is that if x and y are present that they shall not be blurred over by calling the expression a or b or c.

Again, one is continually brought to a standstill by the inadequacy of the terminology of the adult, functional psychology — which is largely an inheritance from the "faculty" psychology — as an instrument of description in dealing with primitive mental processes. And the unfitness of the rubrics of the faculty psychology is realized whether one is concerned with the data of child psychology from the genetic view-point, or merely in an endeavor to *describe* primitive mental phenomena. In the first instance, as Dewey shows, because the genetic method "fixes its attention on growth, on continuity of function; it substitutes the idea of gradual differentiation for the notion of separate mental faculties, it must end by substituting the conception of organic interdependence and of coöperation for the notion [maintained by faculty psychology] of mechanical juxtaposition and external association."¹ The difficulty from the latter standpoint — that

¹ Dewey, *Transactions of the Illinois Soc. for Child-Study*, Vol. IV, p. 65f.

of mere description — being that the terminology of the adult psychology was devised for use in describing developed and not for describing undeveloped, just-appearing, undifferentiated processes. Such words as "idea," "memory," "volition" obviously relate to processes of the developed, not the undeveloped mind. A given process may be the forerunner, the promise of, may be the rudimentary form of an idea, a memory, a volition, but it is clearly misleading to describe such rudimentary affairs as ideas, volitions and so on — as it would be to call a tadpole a little frog, or a boy a little man. The situation is very like that in which the entomologist would find himself if he should suddenly lose the convenient words "pupa" and "larva," and should find himself reduced to the necessity of referring to his embryo specimens as "primitive forms of the butterfly," as "rudimentary beetles" and the like. Infant psychology, even of the functional type, is in great need of a vocabulary especially adapted to its needs just as the embryologist has a set of terms especially designed for his use.

CHAPTER II

DEVELOPMENT OF HAND AND ARM MOVEMENTS

MANY writers, ancient and modern, have attributed man's dominion in the earth to his possession of the admirable mechanism of the human hand. Sir Charles Bell wrote "A Treatise, The Hand, its Mechanism" illustrating the thesis, "that although the superiority of man is in his mind . . . the Hand supplies all instruments, and by its correspondence with the intellect gives him universal dominion."¹ And Darwin expressed the opinion that, "Man could not have attained his present dominant position in the world without the use of his hands, which are so admirably adapted to act in obedience to his will."² One remembers also Fiske's generalization, "that all human art is the increment of the power of the hand." The same thought is expressed more specifically by Burk, as follows:—

"Trace the evolution of the higher human intelligence as we will,—from tool-making and tool-using to modern invention, from manual sign-making to speech, from hut building to architecture, from picture writing to painting, from bizarre

¹ Bell, *The Hand, its Mechanism, etc.*, pp. 40, 157, Revised Edition.

² Darwin, *The Descent of Man*, Vol. I, p. 135, Appleton Edition, 1871.



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PLATE I.—FIVE STEPS IN LEARNING TO CATCH A BALL.

fashioning of fetiches to sculpture, from rude drumming to higher instrumental music—the development of the hand and mentality have ever been in the closest intimacy of association.”¹

A part of the interest which attaches to a study of the development of hand- and arm-movements in an individual child arises out of the consideration just mentioned; namely, that in the history of the race the development of human intelligence and manual skill have run parallel, and have been intimately related. But even entirely apart from this consideration, the development of a child’s ability to use the hands is an attractive subject for study. So we have Preyer, Sully, Miss Shinn, Mrs. Moore, and Mrs. Hall each giving large space to the description of the development of hand- and arm-movements in individual children. The record which follows is offered with the thought of corroborating some of the observations of others; and, perhaps, in the latter part of the chapter of directing attention to some of the earlier forms of ideational movement which, so far as the writer knows, have not been the subject of careful study.

CLASSIFICATION OF HAND AND ARM MOVEMENTS.

The fourfold classification which is usually made of bodily movements in general will be adopted as a convenient method of grouping hand- and arm-movements: namely, spontaneous or automatic, reflex, instinctive, and voluntary or ideational. Each of these four classes of hand- and arm-movements will be described and illustrated in turn.

¹ Burk, *Pedagogical Seminary*, Vol. VI, p. 30.

SPONTANEOUS OR AUTOMATIC HAND-MOVEMENTS

These movements, as the name indicates, are supposed to arise independently of any perceptible external stimulus. The exciting cause of the movement is within the organism, and originates "exclusively in the nutritive and other organic processes that go on in the motor centers of the lowest rank."¹ To illustrate, Preyer found in his observations of the developing chick in the egg that from the beginning of the fifth day,

"the creature moves of itself. Here occur first only movements of the trunk, then also of the extremities and head . . . without the least change in the surroundings and long before the reflex excitability is present at all."² Continuing Preyer writes, "There is nothing left but to assume a cause of the impulsive (automatic) movements that is internal, given in the organic constitution of the motor ganglionic cells of the spinal marrow, and connected, in the early embryonic stages, with the differentiation and the growth of those structures and of the muscular system. With the formation of the motor ganglionic cell in the spinal marrow and cervical marrow a certain quantity of potential energy must accumulate, which, by means of the flow of the blood or of lymph, or possibly through the rapid formation of tissue, is, with remarkable ease, transformed into kinetic energy."³ This potential energy which has been ac-

¹ Preyer, *The Mind of the Child*, English translation, New York, 1890 Part I., p. 196.

² Italics mine.

³ Preyer, *The Mind of the Child*, Part I., p. 203f. Note.—Some authorities doubt the existence of movements originating entirely independent of sensory stimulus. For references, see Sully, *The Human*

cumulated in the growth process when transformed into kinetic energy results in the so-called impulsive (Preyer) or automatic movements.

The auto-excited or spontaneous movements are the predominant pre-natal movements in the child, and are numerous and striking enough in the early weeks of post-natal life to have attracted the attention of many observers of early infancy.¹ In the opinion of Preyer, the slow and apparently laborious bending and stretching of the arms which accompany the first crying just after birth belong to this class of movements. Probably, the stiff and convulsive arm movements which one may often notice when the infant is nursing, belong to the class of automatic movements. So also we may describe as automatic some features of the general bodily tension which often appears in connection with unsuccessful efforts to nurse; for example, the curious asymmetry of closing one hand tightly while the fingers of the other hand were spread far apart, observed on R.'s seventh day. Still another illustration of automatic movements is found in the quick contractions of the arm muscles — drawing the hands toward the face or chest, followed by slow re-

Mind, Vol. II, p. 182, footnote. Cf. King, *The Psychology of Child Development*, p. 23ff.

¹ For these early spontaneous movements, Dr. A. A. Mumford in *Brain*, 1897, suggests the term "Survival Movements," and urges that they are vestiges of an earlier stage of existence. Cf. Robinson, "Darwinism in the Nursery," *Nineteenth Century* for November, 1891; also, Buckman, "Babies and Monkeys," *Nineteenth Century*, November, 1894.

laxing, then another contraction followed by slow relaxation and so on — observed in J.'s first week when the child was crying in hunger. Random movements of the arms are most numerous, however, when the infant is lying comfortably in his crib, rolling the head from side to side, bending, stretching, and waving the arms without any purpose or apparent exciting cause.

The physiologist, as we have seen, relates these spontaneous movements to the lowest nerve centers of the spinal cord, medulla and pons, which, in the first weeks of life, are not related structurally by mature fibres to the higher centers of the brain. They are, in Burk's words, "the lowest level movements. They must represent the movements which are racially the oldest . . . they are movements without higher inhibition, movements as yet without halter or rein, and they tend to disappear just in proportion as the child's capability of executing voluntary movements develops." Yet it must be remembered that these movements, "the flotsam and jetsam of spinal activity" are the ultimate units, and constitute, according to the theory adopted here, an essential preliminary to voluntary movements. They furnish practice in muscle movement, and also a stock of sensations the memory of which serves as a guide when ideational movements arise.¹

¹ For a discussion of the genetic significance of spontaneous movements, see Burk, *Op. cit.*, p. 43ff.

REFLEX HAND-MOVEMENTS

Reflex movements may be defined as those movements in which the excitation of an end organ is transmitted to a nerve center, and there directly and without conscious antecedents sets free an impulse which, through an outgoing nerve fibre, arouses activity in a muscle or other organ. Reflex movements are distinguished from spontaneous movements by the fact that they presuppose the existence of an external stimulus; and they are distinguished from instinctive movements by their greater simplicity—only a small number of muscles or other organs being involved in their production—and by the immediacy of the end they serve; and also by the absence of consciousness—particularly of characteristic moods or feeling-tones which arise in connection with instinctive actions.

The first note relating to reflex hand-movements which my record contains is with reference to clasping with the fingers. When J. was four hours old he firmly clasped a finger which was placed in the palm of his hand.¹ On R.'s second day, when his cheek was lightly touched, his right hand made a quick and strong movement toward the face as if to remove the disturbance. A light touch of J.'s forehead while the child was asleep caused, on the second day, the arms to fly up convul-

¹ In this first clasping, the thumb did not play a part, merely resting lightly against the second joint of the fore-finger. Clasping with the thumb contraposed, in the case of J., was established by the middle of his fourth month.

sively, the fingers to extend, and twitching of the facial muscles. An unsuccessful effort was made on R.'s second day to get the child to cling to a pencil or finger while he was lifted from the bed. On his third day, R. clung to my fingers firmly enough to be half raised from the bed, and it seemed clear that if his clothing had been removed the child would have supported his weight with ease. But the child's attendants objected strenuously to such heroic performances, so there my experiments on the clinging power ended.¹ On the fourth day, if one allowed R. to clasp one's finger then pulled as if to take it away, the child would begin to fret and often made an outcry. It was noticed that both R. and J. clasped a pencil or one's finger more firmly when nursing than on other occasions.

INSTINCTIVE HAND-MOVEMENTS

*Reaching and grasping.*² — Preyer truly observes that "of all movements of the infant in the first half year, no one is of greater significance for its mental development than are the seizing movements." Preyer had in mind the significance of these movements in contributing to the mental development of the child. It may be said also that they are of great significance as regards the insight which they afford as to the nature and order of that

¹ See Sully's *Studies of Childhood*, New York, 1896, p. 17, for a humorous, yet substantially true, statement of the difficulties encountered in studying early forms of infant activity.

² Whether the first reaching and grasping shall be classed as reflexive or instinctive is more or less an arbitrary matter. The fact seems to be that they originate in spontaneous movements, *i. e.*, consist of factors made spontaneously, then pass through reflex and instinctive stages, and later pass into truly volitional actions.

development. On this account, and also because of their relative simplicity and isolation, and comparative ease of observation, reaching and grasping have been favorite subjects among the observers of children's ways.

It is in order, first of all, to observe that when one speaks of the appearance of the reaching instinct that one does not mean that the impulse to reach bursts forth suddenly like the sprout from an acorn, or like a chick from its shell. We are not to suppose that on a given day, or possibly at a given moment, one sees the hand of the baby shoot forth toward an attractive object in a manner wholly unlike any previous movements. Reaching and grasping do not come forth full-fledged. They afford an excellent illustration of the slow development and perfection of an instinctive tendency, and perhaps no class of movements illustrates more clearly and strikingly how by imperceptible steps one kind of movement passes into another of a higher rank.

R.'S LEARNING TO REACH AND GRASP

Beginning with R.'s tenth week observations were made of his impulse to reach and grasp a colored tassel which was frequently suspended within reaching distance of the child as he lay in his crib. From the first, the sight of the object pleased him, calling forth arm-flourishing. In some of these arm-flourishes, the hand came in contact with the tassel, and on two different days during the tenth week it seemed that the child tried to grasp the object; but he did not know how to

get his fingers around the toy—usually merely punching it with the thumb and forefinger.

In the *twelfth week*, the child was greatly pleased when one dangled over him brightly colored objects as a watch or yarn tassels. There was, also, apparently an attempt to seize the objects so held. But one could not be sure that the child really tried to get the articles in his hand. What he did was to strike the tassel or watch with his fingers or thumb. The question was, did the child try to get in his hands the article suspended in front of him? or was the flourishing merely an expression of his pleasure at the sight, and resulting in an occasional contact with the tassel or watch? One was inclined to the first view when it was observed that the child looked at and "felt" his own hands by the half-hour. His hand, on account of its numerous appendages, was more easily grasped, and so, for a time, was a favorite plaything. If his own hand called forth the impulse to examine and "feel," why not a foreign object like a yarn tassel or a watch? provided the foreign object was in motion.

The notes for the *thirteenth week*, relative to reaching and grasping, are to the effect that the child did not make any attempt to reach or grasp objects held in front of him, no matter how greatly pleased he was by the sight of them, unless they touched his hands. When they did touch his hands the desire to get hold of them seemed to arise at once. But he rarely succeeded—merely fumbling, scratching, striking at the ball, watch or other object. On a certain day, a watch was held about seven inches from his chest and about eight inches from his eyes. At first, he lay very still, not a muscle stirring, gazing. Then he began to kick rapidly, and one arm flew up and chanced to strike the watch which he fumbled as if to "feel" it or to get it in his hands. It seemed as if the sight of the bright object set the kicking and arm-throwing muscles in motion.

The notes made in the fourteenth and fifteenth weeks on reaching and grasping are substantially the same as for the thirteenth week. Pleasing objects held before the child called forth only expressions of pleasure—kicking and arm-throwing in a lively manner. When either of his hands came in contact with the objects he at once began to scratch at, strike, and catch at them as if to seize them.

Sixteenth week (first day). — When toys were held in front of the child he threw his arms about, striking the hands together; and if, in so doing, he chanced to grasp the object, it was held. But this was not yet deliberate, directed motion of the hands toward an object, a movement which appeared definitely and unmistakably on the *fifth* day of the sixteenth week. On the last named day, a careful test was made of the child's inclination to reach for things held over him as he lay in his crib, and as a result of the experiment one could not doubt that the child tried to get his hands on the objects which were held over him. To be sure, many of his hand-movements appeared to be mere punches with the thumb or forefinger, or striking with the finger tips. But when the object—whether it was a finger, a tassel, or the leg of a doll—was grasped, he held fast, and stopped the arm-flourishing which had preceded the successful grasping. A note made at a later hour of the same day reads, "Holding attractive objects over the child seldom fails to call forth arm-movements which cannot be mistaken for random arm-flourishing. Most convincing of all is the fact that the child begins to fret when he fails to get his hands on the object."

On the last day of the sixteenth week, a watch was twirled within six inches of the child's face as he lay on his back in his crib. He first looked steadily at the watch for twenty seconds, then threw his right arm toward it, touching it and fumbling over it with his fingers for a few seconds. His arms then took

their former position at the side of his head ; then he began to writhe and struggle and his mouth filled with saliva ;¹ then he threw his right arm toward the watch as if to take hold of it, and finally he did get it between his first and second fingers. Here was an unmistakable effort to get his hand on the watch.

By the end of the seventeenth week, reaching and grasping were well established, needing only practice to render them sure and ready. By the end of the twentieth week, the child reached for everything, with one exception, which was held toward him. The one exception, curiously, was his nursing-bottle. And his unwillingness to reach for the bottle (which was a cylindrical eight-ounce flask) notwithstanding the fact that he would reach for practically everything else (*e. g.*, balls, rattles, dolls, toy animals) which was held out to him, is an excellent illustration of a habit inhibiting an impulse. That is, the habitual thing in his experience with the bottle was for some one to hold it for him, leaving his arms free to do what they would. He had not been trained, as one would say, to reach for the bottle, or to hold it while nursing. So when the bottle was held before him he made no effort to grasp it, but threw back his hands and arms and cried. And it was not until the *forty-third* week that the child would take the bottle when it was held toward him ; and even then the reaching and grasping were feeble and unwilling. Even as

¹ The flow of saliva which accompanied the struggling and reaching on this date was observed on several later dates. What did it mean ? Whether the child was hungry and the sight of the watch set in motion the salivary glands ; or whether it was a sign of a desire to mouth things, or what its real meaning was, I do not venture to say. It was noted frequently during the next two months that the mouth played a sympathetic part with the reaching, grasping, and pulling at things which were held toward him. For example, the pulling motion was accompanied frequently by opening the mouth, as if the pull at a resisting object—as one's hand—at the same time opened the mouth.

late as the fiftieth week the note reads: "the child will not take the bottle at once when offered to him; takes it rather reluctantly, but handles it skilfully when it is once in his hands. Bottle is reversed at once if the nipple end is farthest from him, and if one purposely fixes the bottle in the child's hands in an impossible position for nursing, he speedily sets it right." (See Figs. 6 and 7, Plate II, showing the position of the hand for two periods [tenth and twenty-ninth months] when reaching for objects.)

IDEATIONAL HAND MOVEMENTS

Learning to Use the Hands

We often wonder at the number of ideas the child acquires during his first three years; at his marvelous progress in learning to use his native tongue; at the wealth of his imagery; and at his intellectual resourcefulness in interpreting the world in which he finds himself. Hardly less marvelous is his progress in mastering the use of his hands, in learning to do things with them, a progress which ordinarily is not remarked. To be sure, we think of the child's struggles with the pencil when he begins to write or draw, of his first crude attempts to use the simpler carpenter's tools as the knife, saw, and hammer. But long before he reaches this relatively high stage in his development on the manual side, he must have learned a large number of hand-movements more difficult and often more complex than the child is called upon to perform in the kindergarten or primary-school years.

It will be the purpose of the paragraphs which follow to enumerate, and to outline the development of some of these infantile hand-movements, the learning of which the environment imposes upon the child with the same rigor that it requires the acquisition of certain kinds of knowledge as a condition of being at home in the world. In fact, learning to use the hands and storing the mind with ideas about the physical world are so intimately related, particularly in the early years, as we have seen already, that they must be regarded as two phases of the general developmental process.

Before proceeding with this outline, it will be in order to make two observations which apply to all acquired hand-movements. In the first place, they are all, on the physical side, repetitions or combinations and modifications of earlier movements performed many times at random, reflexly or instinctively. They are modifications of the earlier reaching, grasping, holding, pulling, pushing, shaking, threshing, throwing, turning, extending, patting, twisting, striking, rubbing, tossing, lifting—all of which had been performed countless times involuntarily before they were performed purposely, or became factors of purposive movements. These random, reflex, instinctive movements furnish the raw material out of which more complex hand-movements are built up. They stand in somewhat the same relation to ideational or purposive movements that the prelinguistic babbling,

instinctive and emotional vocal expression of the infant stand to articulate speech.

It is often said, and truly, very probably, that an adult's speech does not contain a single sound which was not uttered many times in infancy. It may be said with equal certainty that the elements of all adult hand-movements are to be found in infantile hand-movements of the first year. So when one undertakes to trace to its beginnings a movement like throwing a ball, turning a door-knob, or scribbling with a pencil one gets lost in a tangle of random, reflexive and instinctive hand-movements.

In the second place, all of the acquired movements enumerated below, with possibly two exceptions, originate in imitative behavior, and are mastered by the method of trial and success. For example, the child sees an older person grasp the door-knob and open the door, and begins imitatively to work at the knob, pulling, tugging, twisting and turning it as well as he can. Sometimes the tugging at the knob is in order to open the door to get out of the room ; sometimes without any other purpose than to do in a general way what the child sees another person doing. If, in either case, the door is unlatched, the success, designed or accidental, becomes a new stimulus to pulling, tugging, twisting, fumbling at the knob. No doubt imitation often enters as a factor in guiding the learning process, but its most important function, at the outset, is to set the motion going.

The list of hand-movements which follows includes

only those which had to be learned, and which required, in most cases, a period of practice. Some of them, it will be seen, were for play, for the child's delight, while others had definite utilitarian values; the child needed them to help him get along in the world.¹

Learning to use a spoon and fork to carry food to the mouth.²

—The baby's first attempts to feed himself with a spoon or fork, from the artistic view-point, end in flat failure. The performance usually yields results which are far from satisfying to the æsthetic sense; in fact, the baby makes a mess of it. But the baby's sense of the beautiful is not easily offended and he enters into the learning with eagerness.

My notes do not contain an answer to the question, When will a child, unaided, begin to feed himself with spoon or fork? for the reason that neither of the two children whom I observed, as they learned to feed themselves, had an opportunity to make a beginning of his own motion. It was found that as soon as the child held a spoon or fork in his hands and poked around, in rough imitation of his attendants, in the cups, bowls or saucers which contained his food, he was ready to try to feed himself if given a little help. This little help necessary to set in motion the self-feeding process R. received in the fifteenth month (446th day). The child was rubbing and punching with the bowl of a spoon in the saucer from which he was being fed.

¹ The particular hand-movements which a child learns will depend somewhat upon the conditions surrounding him, the kinds of things he sees others doing, the nature of his toys, the latitude or climatic conditions, his freedom, whether he belongs to a civilized or barbarous race, etc.

² The use of spoons and forks to carry food to the mouth is a modification of the carrying-to-the-mouth motion which is so conspicuous a feature of the hand-movements of the latter part of the first year.

The child's mother took hold of the hand which held the spoon and put it through the motion of dipping food and carrying it to the mouth. The child grasped the essential features of the movement at once, and without guidance began to rub the bowl of the spoon in the saucer, then carried the spoon to his mouth. At first the movement was very awkward and yielded slight food results. But when the child rubbed the bowl of the spoon across and around his mouth he got a taste of food, enough, perhaps, to strengthen the desire to use the spoon in the new way. On the following day, he picked up the spoon and went through the same motion of rubbing the bowl of the spoon in the dish containing his food, then carrying the spoon to his mouth. Three days later it was noted that he was eager to feed himself, and refused to eat from a spoon held by another person, kicking, throwing his arms, turning his head, and crying in protest, all this notwithstanding the perfectly evident fact that he would have starved on the small quantity of food he was able to get into his mouth in the time usually set apart for eating.¹ He had, however, made the necessary first step, and it was only a matter of practice until he would be able to handle the spoon with ease in feeding himself.

¹ The child J. also, very soon after his first lessons with the spoon, developed an unwillingness to eat from a spoon held by another person. Accidentally, it was found that if the child was allowed to hold a spoon which he could rub in an empty dish while he was being fed he was willing to take food from a spoon held by another person. So during a period of three weeks two plates or saucers were required in feeding the child: an empty one placed so he could punch and rub in it, and a second containing his food held so as to conceal the empty one. This arrangement proved satisfactory to all concerned. The performance reminded me of a chance observation I once made of the energetic, but wholly useless and ludicrous, scratching the bare floor by an old hen as she picked grains of corn from the cob. Scratching had become a fixed part of the process of taking a meal. In the case of the child, rubbing a spoon in a dish became in a few days an integral part of the food taking process.

It is perhaps unnecessary to relate, or describe, minutely the tedious and inartistic details of the period of practice in learning to use the spoon. It will be sufficient to refer to a few of the adjustments which must be made before the child can use the spoon skilfully. How delicate these adjustments and muscular coördinations must be can be made clear by reference to two defects of the beginner's struggles. In the first place, the handle of the spoon is grasped awkwardly. Palm down the hand seizes the spoon-handle as if it were a cheese knife, or a meat ax, a good position for striking or jabbing but not for dipping. (See Fig. 5, Plate III.) In the second place, the handle of the spoon is not raised high enough and the bowl of the spoon strikes the mouth in an almost vertical plane, preventing the spoon's entrance to the mouth and allowing the food to fall out. These two obvious defects of the child's first ventures with the spoon will serve to illustrate the nature of some of the defects which must be overcome in practice, by a process of trial and success. This period of preliminary practice in the case of R. extended over a period of more than five months. That is, it was not until his twentieth month that the child had acquired sufficient control over the unruly spoon to get a fair share of the food which was allotted to him into his mouth and not on his bib, chair, and the surrounding territory.

In the meantime the child had acquired good control of the table-fork as an instrument for carrying food to the mouth. It is clear that the fork can be used much earlier than the spoon as a feeding implement, provided the food is in particles solid enough to hang together when pierced by the fork-tines. For example, R. could pick up strawberries with a fork three months before he had the skill to pick them up and carry them to the mouth with a spoon.

Learning to throw a ball. — Learning to throw a ball,

or other similar article, is a particularly good illustration of the adaptation and specialization of old movements for new purposes. The throwing motion is made countless times before the child throws purposely, and it is not difficult to trace throwing to a number of earlier, fairly distinct hand-movements like shaking, tossing, threshing a newspaper, tossing and shaking toys — which one may observe as early as the eighth month, or earlier in the case of some children. A little later, the child begins to carry his toys to the edge of his crib, letting them drop as if to get rid of them, or possibly to hear them fall: or, if seated in a high-chair, the child will pick up from the table and drop on the floor spoons, dolls, rattles, balls — in fact, anything he can reach. Out of such movements the throwing motion is differentiated and selected. And if there is a ball in the child's collection of playthings, ball throwing in particular is selected, one may suppose, because more happens when a ball is thrown or tossed than when another article, such as a spoon or rattle, is thrown. The ball rolls away giving the child the delight which accompanies the sight of all moving things. So ball throwing soon comes to be a favorite form of play.

My observation of R.'s learning to throw a ball began in the first week of his second year. At that time, before the child had learned to creep, he would sit on the floor and throw a ball as long as any one was willing to get it and return it to him, shouting with delight at every

toss or throw of the ball. As soon as he was able to creep, he spent the greater part of his play hours in tossing, throwing, rolling the ball about the room and creeping after it. So also when he could walk, throwing and running after the ball was his leading occupation.

The manner of throwing throughout the months of the second year, was what the schoolboy calls "overhand." The hand was raised above the head and the ball was thrown by a forward motion of the hand. (See Fig. I, Plate IV.) In the twenty-third month I made a number of measurements of the distance which the ball was thrown, the average being eight feet and a small fraction. (The ball was a hollow rubber one two and one-half inches in diameter, and weighing two ounces.)

The first attempt to *bounce* the ball was made in the twenty-seventh month. The first bounce, as one would have expected, was really a short throw. But he soon selected the correct motion, and was able by the end of the twenty-eighth month to bounce a ball, similar to the one described above, so it would rise three feet after striking the floor.

It was said above that the first throwing was overhand. This manner of throwing was the rule until the thirtieth month when, for some reason, I know not what, he fell into the way of throwing side-ways or underhand. (See Fig. I, Plate II.) And it was with difficulty that one could get the child to use the earlier method of throwing

over-hand. Throwing with a side swing or underhand toss continued throughout the remainder of the third year to be the favorite manner of throwing balls, stones and other similar articles.

Learning to catch a ball.—I first tried to teach R. to catch a ball in the twenty-ninth month, but with little success. He adjusted his hands with care, looking at them as if getting ready to perform a very difficult feat, placing the little fingers in contact, but held the palms of his hands so near his chest, or face that he was unable to catch the most carefully tossed ball. The position of the hands was unfavorable for catching. But worse than the position was the fact that, at first, he made no effort to close his hands over the ball when it did strike the palms of his hands. Nor did he make any effort to reach out toward the ball and seize it when it was tossed to him. So the only idea or factor in the rather complex adjustment necessary to catch a ball which he was able to get was the idea that the two hands should be held together in front of the body. I tried again in the thirty-second month to teach the child to catch a ball, but with little better success. The only difference noticeable in the position of the hands was that he adjusted them with more care, and held them nearer his face than in the earlier months. (Plate I illustrates five changes in the positions of the hands in learning to catch a ball.)

Learning to turn a door-knob to open a door.—It

required a little more than two months of irregular and occasional practice and experimenting for R. to learn to turn a door-knob and pull a door open so he could get out of the room. I first tried to teach him to turn the knob and open the door in the last week of the twenty-fifth month by taking hold of his hand and putting it through the motion of turning the knob and opening the door. But the child could not get the idea, he didn't understand what was to be done, although he would pull and tug at the knob as, indeed, he had for several months before.

A few notes from the record for the twenty-sixth and twenty-seventh months will be transcribed to indicate the general order of progress in learning to open a door.

Twenty-sixth month (last week).—The child could not turn a knob either to open or shut a door; he had not associated turning the knob with latching or unlatching the door; *i. e.*, he did not understand the use of the knob.

Twenty-seventh month (second week).—The child tugs at the door-knob, pulling, turning, twisting, and succeeds sometimes in getting the door open. He understands now that tugging at the door-knob is followed by the door's opening. But he does not yet make the necessary combination of movements to get the door open. (Third week) The child is able to close a door and latch it after considerable tugging and turning.

(Fourth week) When trying to open a door, the child turns the knob back and forth rapidly, but does not understand that he must at the same time pull in order to get the door open. He gets the plunger or bolt out of the catch, but does not at the same time pull toward himself, and so fails to get the door open.

Twenty-eighth month (second week).—The child seizes the knob of a door, gives it a turn to the right and pulls the door open almost as quickly and skilfully as an adult would. All tugging, twisting, pulling, pushing have disappeared, and the child opens a door almost as well as a grown person, not quite so quickly or gracefully perhaps — but practice will soon give speed, and will wear off the rough edges of the performance.

Learning to turn leaves in books and magazines.—As early as the middle of the sixteenth month, R. was interested in opening and shutting a book. On a certain day in the third week of this month the child opened and shut a small school-reader twenty-nine times. The interest at that time was in the motion, in what he could do with the book. The movement belonged to the class of "persistent" imitation, as described by Baldwin, and the delight was not unlike that which Baldwin's child found "in putting the rubber on a pencil and off again, each act being a new stimulus to the eye."¹

Three months later, probably owing to his having been

¹ *Mental Development*, Vol. I, p. 132.

entertained by being shown pictures in magazines, R. began to turn through the leaves of books in order to see what was in them. Sometimes the magazine or book was so held as to allow the leaves to roll off the thumb; at other times, he held the book in his right hand, striking the leaves with the tips of the fingers of the left hand.

Twenty-eighth month. — The child rested a book or magazine in his right hand, as an older person might, letting the leaves fall off the left hand.

Thirty-sixth month. — Held book in the right hand and turned the leaves by placing the fingers of the left hand at the top edge of the page.

Learning to use a pair of scissors. — In the last week of the twenty-sixth month I tried to teach R. to use a pair of scissors. After watching me, he properly placed the thumb and forefinger in the handles, pulled them apart so the blades were open, but he didn't understand what to do in order to get the blades to close. He was in a predicament; he had the scissors open and did not know how to shut them. I then took hold of his hand, pressed the thumb and finger together. This I did a few times and he caught the motion and proceeded forthwith to cut, somewhat clumsily, the edge of a piece of paper. Improvement in the use of the scissors was rapid, so far as cutting merely for the fun of it was concerned. I tried on several occasions, in the latter part of the third

year, to get the child to cut pictures from newspapers, but without success. He could not control the scissors and the paper at the same time.

Learning to screw the top on a paste-bottle. — The child R. learned, from watching another, to turn the top on a small, library paste-bottle (twenty-seventh month). It seemed that the ability to make the necessary left to right turning motion with the fingers of the right hand was natural. At any rate, the motion required no practice or teaching beyond seeing another person make it. But the child could not make the right to left motion necessary to unscrew the top, and I could not teach it to him even by putting his hand through the motion. The experiment with the paste-bottle was repeated in the thirty-first month. Then, as on the former occasion, the child failed to grasp the method of unscrewing the top unless the bottle was held in the right hand and the top turned with the left. He succeeded then because the easy, natural turning motion with the left hand unscrewed the top. The experiment was made again in the thirty-sixth month. I took off the cover and asked the child to put it on. He first set the cover on the bottle saying, "On now." I then said, "Turn it on," which he did with ease. Then I said, "Now take it off," and he began turning the cap in the same direction as when putting it on. I then said, "turn the other way," and he immediately reversed the turning motion and unscrewed the top without fur-

ther help or direction. The request to put the top on was repeated a number of times and was carried out promptly; also the request to take it off. He had learned, at some time or other, the meaning of the words "turn the other way." That is, he understood, as he did not at the earlier dates, the direction to reverse the motion of his fingers. When or how he learned the meaning of "turn the other way," I do not know.

Learning to put on his own shoes. — For the mastery of this important, practical accomplishment, R. required much practice extending over a period of fifteen months, beginning with the fourteenth. In the last named month, if the child chanced to come across one of his shoes as he moved about the room, or if a shoe was tossed to him he pressed it against his foot showing that he remembered, in a general way, the customary place of the shoe. Perhaps one is not warranted in saying that, in these early efforts, the child was trying to put the shoe on; it was rather an imitative movement suggested by the idea of shoe-on-the-foot, or by the memory of seeing other persons put on his shoes. As has been indicated already, the child made the first successful effort to get his shoes on in the twenty-ninth month; that is, he could pull the shoe on, sometimes quickly, sometimes only after a great deal of pulling and tugging, depending upon the looseness of the lacing and the position of the shoe with reference to the foot. After the child had learned to pull

on his shoes it was thought that it might be possible to teach him to lace them too. But shoe lacing is too intricate and involved a feat for the three year old. He grasps the idea that the strings go in the holes, but the order is too difficult for him; so "lacing" shoes is merely taking a string and putting it in any unoccupied eyelet.

Picking up and manner of holding cups, glasses, bowls, saucers, etc.—The baby's method of grasping and picking up cups, bowls or saucers, affords a curious and interesting illustration of the so-called survival movements from a pre-human ancestry. When an adult or a child, well past the years of infancy, picks up with one hand a jar, crock, or bowl, which is too large to clasp around the outside with one hand, he places the thumb inside the bowl and grasps the rim of the vessel with the thumb and fingers. But the baby employs the so-called simian method of grasping and picking up cups, bowls, and saucers. The hand is extended, palm downward, toward the desired object—dish, cup or saucer—the *fingers*, not the thumb, are placed inside the vessel, and the rim is pressed against the palm of the hand in order to pick up the object so grasped. The first note with reference to R.'s method of grasping a cup in order to pick it up was made in the early part of the thirteenth month. At that time the child used the simian method, as described above, and that method of seizing cups or bowls was employed until the last quarter of the third

year. In the thirty-fifth month two instances of grasping a bowl by placing the *thumb* inside were noted; in the thirty-sixth, one. At the time of this writing (R.'s thirty-ninth month) bowls and similar articles are almost always grasped by placing the fingers inside, while saucers and plates are, so far as I have observed, picked up by placing the fingers *under* the edge of the saucer or plate after the manner of adults. That is, the simian method of grasping plates and saucers has disappeared, but is still the favorite method of picking up cups and bowls.

Additional hand-movements.—The general nature of the process of learning to do things with the hands is perhaps indicated at sufficient length in the preceding paragraphs. This section will conclude, therefore, with the mere naming of a number of other hand-movements which the child learned, or tried to learn before the close of the third year. Among those learned were:—To open a pen-knife; to wind a small clock; to open a drawer; to wash his own hands; to put a door-key in a key-hole and lock and unlock a door; to push the button of an electric door-bell. The following is a partial list of hand-movements which we tried to teach him, but without success:—To lace his shoes (mentioned above); to button and unbutton his clothes; to put on his coat; to tie a single knot in a string; to swing a rope for the game “jump the rope”; to tear from paper forms representing his favorite toys and animals.

Use of the right and left hands. — My observations of R.'s use of the right and left hands began in his third month, and were directed to answer the one question, which hand does the child use more? The record is not as full of definite, detailed statement as one wishes, the usual form of the note being, "right hand preferred," "uses the left hand more at this time," "holds ball in right hand," and so on. I do not mean, however, to cast doubt upon the accuracy of the "mere impressions," as one may call them which the notes contain. They were based always upon careful observation of the child's hand-movements during half-hour or longer periods; and on several occasions the number of times each hand was used in picking up, reaching, feeling, pulling, throwing was counted, and the result entered in the notes. But this method was not followed uniformly, hence the lack of full, detailed statement.

Third month. — No preference for either hand was noticeable.

Fourth and fifth months. — In these months the right hand was used more frequently.

Sixth to eleventh months inclusive. — No noticeable preference for either hand.

Twelfth to the close of the thirty-sixth month. — A slight preference for the left hand began to appear early in the twelfth month, and it increased so rapidly that by the time the child rounded out his first year he

was clearly what one would call left-handed. Toys were picked up with the left hand, a ball was thrown or tossed with the left hand, the left hand was used more in reaching. Left hand movements were surer and more graceful as well as more numerous. At this point, we began systematically to break up the growing preference for the left hand, and to encourage the child to use the right hand rather than the left. Articles were refused him when he reached with the left hand for them, and care was taken when giving the child toys and other articles to place them in his right hand. Either as the result of our training or as the outcome of native tendencies, the right hand began, in the latter part of the fifteenth month, to return to its former place of ascendancy. In the last week of the fifteenth month, I counted forty-nine instances of reaching for toys. Twenty-four were with the right hand, twenty-one with the left, and four with both hands. The preference for the right hand indicated by these figures is not great enough to be significant further than to show the returning prestige of the right hand. From the *sixteenth* month forward the right hand came gradually to be used more, though both hands were used. A note made in the nineteenth month, for example, reads, "Uses both hands in reaching, picking up, and throwing things, but the right hand is used more." Another note made in the twentieth month reports, "Ball throwing and spoon holding are decidedly

right-handed." So well fixed by this time was the habit of throwing with the right hand that the left hand was not used even when the ball was picked up with the left hand, the ball being changed to the right hand before it was thrown. We shall not follow the record through month by month for it only repeats and illustrates what has been stated already. By the end of the second year the child was decidedly right handed, and has been so ever since.¹

¹ As one watches the child now (forty-fourth month), so strongly right-handed, one often wonders what would have resulted if he had been allowed to continue without interference or training on the line he set out in the twelfth month. Would he have become as decidedly left handed as he is now right? Other questions which arise in this connection are whether children are natively either right or left-handed which no amount of training can change; or whether it is a matter of training; or are some or all children naturally ambidextrous, but will develop right or left-handedness under training? . . . The whole matter of right and left-handedness should have much wider study than it has so far received. See Professor Baldwin's *Mental Development*, Vol. I, Chap. IV for interesting data, references to literature, and a critical discussion of the theories relating to the origin of right-handedness.

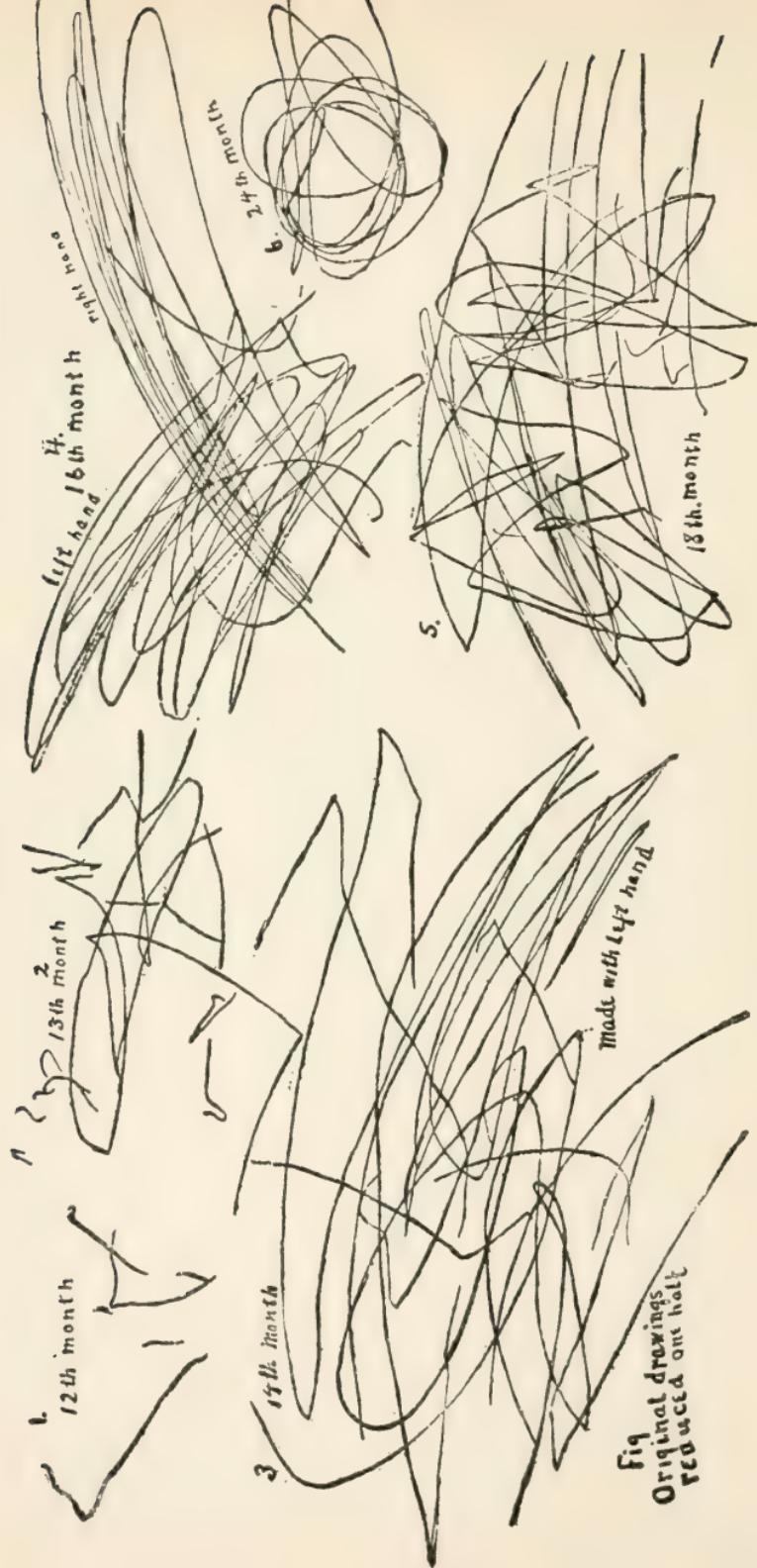


FIG. 1.—A CHILD'S EARLY PENCILING.

CHAPTER III

DRAWING

INASMUCH as the principal aim of this chapter will be to illustrate the early stages of the child's penciling and drawing, the figures which follow will form the chief point of whatever interest or attention the chapter may have. The figures are selected from a large number of pencilings and drawings which R. made during his second and third years.

STAGES IN R.'S LEARNING TO DRAW

First stage,—crude, imitative hand-flourishes.—Among civilized peoples, the child's early penciling and drawing have their roots in the imitative impulse. Pencil in hand, the child will strike or punch at paper laid before him in rough imitation of an older person writing or marking. He will use a stick, spoon, or other similar article in the same way. At first, the child does not see that the pencil and the marks are in any way related. Probably at first he does not see the marks. At any rate, he does not see that the pencil makes the marks.

In the last week of his first year, we for the first let R. have a lead-pencil and paper, at the same time making

some marks on the paper as it lay before him.¹ He at once made arm-movements roughly like those I had made in making the marks. But the writing or "drawing" was only a striking or punching at, or rubbing the pencil over the paper, the leaded end of the pencil not touching the paper at every stroke, and so making no marks or scratches. It was essentially an imitation of my hand movement. (See Fig. 1, No. 1, for copy of R.'s first penciling). On nine different days in the course of the next four weeks, the child was given pencil, paper, and a copy in the way of marks or hand-movements. The only change or advance noted in this period was that the arm-movements became freer. But they were still crude, imitative flourishes resulting in a number of disconnected, purposeless scratches. (See Fig. 1, No. 2.)

Second stage.—Purposive penciling. The random striking or scratching with pencil, and the resulting disconnected lines of the first stage gradually gave way to a

¹ It was my purpose from the outset to keep the child's early penciling as free as possible from outside stimuli and guidance, merely supplying him with pencil and paper. But it was found that he would do very little penciling spontaneously, or without suggestion from some source. So I at first made heavily shaded circles as copies, and later made many rough sketches for him, sometimes at his request, sometimes as models which I wished him to try to copy. I have never taken hold of his hand and tried to teach him pencil movements in that way—an effective method if one is especially desirous of a precocious development of ability to use the pencil. I have, however, as just stated often encouraged the child by asking him to "make" or "write" a ball, or "choo-choo," or other of his favorite objects for drawing.

fairly uniform left-to-right or back and forth motion of the hand producing slightly curved lines four to six inches in length, with a loop at each end, and having an upward slant of about thirty degrees. (See Fig. I, Nos. 3 and 4.) The left-to-right motion of the hand in marking first appeared in the second week of the *fourteenth month*, and by the end of the *fifteenth month* the movement was under good control; and, with few exceptions, it was the only motion made when penciling until the end of the *eighteenth month*.

It was in the early part of this period—middle of the *fourteenth month*—that the child first made purposive hand-movements with the pencil; that is, first *tried to make marks*. In other words, the first purposive marking began with the long, swinging motion producing the lines represented in Fig. I, No. 3.

Third Stage.—In the latter part of the *eighteenth month*, the child showed a tendency to break away from the long, curved line returning upon itself, and to produce a greater variety of figures, most of which included three classes of lines: right to left, up and down, round and round, or circular (Fig. I, No. 5). Sometimes the marking began with a side motion of the hand, then up and down strokes were made without lifting the pencil from the paper; then a circular swing would be introduced as if to vary the performance. This was clearly marking for fun, or merely to

make marks, much as at a later period the child used a pair of scissors to cut paper. He cut paper because he liked to; paper-cutting was an end in itself. And so scratching, making numberless, aimless scribblings was something sufficient in itself. To have asked the child, What are you doing? would have brought the reply, could he have answered, "making marks."

Fourth Stage.—The next step was the awakening of interest in the letters and figures which I drew for the child as copies. During the twenty-second and twenty-third months, I often made for him and tried to teach him the letters B and O; and also, for his entertainment, made many rough sketches of men and horses. Occasionally in the twenty-third month, the child asked for a "pūtu" (a pencil) to make "mūms" (horses), Os, Bs, and balls. In the course of the next four months he often begged for a "putu," and if asked, What do you want to do with the putu? would say "mūm," or "baw," or "O Bob," meaning probably that he wanted to mark as I had when drawing a horse, ball, or letter for him.¹

¹ At this time, the child's favorite subjects for drawing were O, "mum" (horse) and ball. He was greatly interested in those objects and they were selected because it was thought it would be easy to arouse his interest in drawing them. Contrary to the observations of others, I have not found that the human figure appeals strongly to the little child as a thing to be drawn either by himself or by others. It was not until the last month of his third year that R. was interested in making a "man," although the figure was frequently made for him, and a special effort was made to make it attractive. One of my students found that the first object

Fifth Stage.—The up and down, round and round, back and forth motion described above was displaced gradually by a circular or oval movement somewhat awkwardly executed and producing an irregularly shaped figure—yet bearing some resemblance to circles or ovals (Fig. 1, No. 6). At first this figure was made for its own sake, in play, without any idea of representing anything by it. But it soon came to stand for whatever object the child said he was drawing—a horse, a ball, or a man. So whether marking merely for the fun of marking, or when “drawing,” the circular or elliptical figure was the dominant one in the first six months of the third year.

At this time—first half of third year—R.’s drawings, except of O, had not the slightest resemblance to the things he was supposed to be drawing, being merely scratches from right to left, up and down, round and round—most frequently the last. What did he mean then by asking for pencil and paper, and saying, as well as he could, that he wanted to “make O,” or “baw,” or “mum”? What did “make O,” etc., mean to him? Did he think that “making” one of these figures is merely making marks on paper? Did he ask for pencil and paper, at the same time naming a given subject for drawing (horse, ball, or a letter) with the intention of trying to make a representation of it? or did he mean merely that he wanted to make marks? Did he have a mental image of the thing named—even a vague one—which he wanted to project on paper? or was his image, such as it was, merely of scribbling on paper, which her subject (twenty months old) wanted to “make” was a cat; another found that a child of twenty-two months wanted to make “Bows-er,” a favorite dog.

partly visual and partly motor? The answer to these questions will be, at best, conjectural. But it is the writer's opinion that, at first, the request for pencil and paper to make so and so was merely an expression of the child's desire to scribble imitatively and did not mean that he wanted, as an older person might, to "draw," *i. e.*, represent by lines the figure named.

Somewhat later the child does image, roughly, the things he names, and he wants to transfer his images to paper. But his drawing is merely a tangle of marks, bearing no resemblance to the thing he sets out to draw. And the question is, why doesn't he produce something bearing some resemblance to his mental copy? An answer to this question is found, in the main, in the single consideration that the child lacks the ability to draw what he images; coördination between the hand and eye is lacking. The child, it is said, is not practiced in drawing, in the use of the pencil,—does not know how to go about transferring his mental images to paper; there is imperfect coördination between the imaging and the physical activities involved in copying images. So when the little child is given pencil and paper and asked to draw a given thing it turns out that he is unable to manage the image and the necessary hand-movements at the same time, to bring the image and the hand into the relation of guide and guided.

Another fact which should be taken into account in explaining the child's failure in transferring his images to paper is that frequently, soon after the child begins marking, he becomes absorbed in the pencil and the marking and the image fades. Even as late as R.'s thirtieth month, it was evident from his calmness in the presence of the most unlikely performances that his images soon disappeared; at any rate, that they failed to direct his hand-movements. And it was often noticed, as the drawing proceeded, that he frequently changed his mind as to

the thing he wanted to make. It also often happened, in the course of his scribbling, that he fancied he saw another figure in the scrawls, and this fancied figure instead of being looked upon as an intruder was often hailed with delight, showing that the original image, whatever it was like, did not exercise much, if any, influence over his hand-movements.

It is suggested by a number of writers that the child's poor showing in drawing is due to his rich endowment of imaging power which enables him to transform the most unpromising scrawls into likenesses of real objects; that when he makes an awkward looking circle, or scratches back and forth, or makes a number of detached marks that these are sufficient to call up in his mind vivid images of his model, just as in the adult a few notes from a familiar tune often revive an entire musical selection, or a few skilful strokes of a pencil are enough to call to mind a familiar face.

With reference to this theory it may be said that although children of the age we are now considering — one and a half to three — do have pretty active imaginations, it is well to remember that rich and varied imaging requires a wealth of perceptual material, clear and definite, not possessed by the average child under three years of age. For this reason, the writer is not disposed to attach great importance to the "vivid imagination" theory as an explanation of the defects usually found in young children's drawings. In this connection, may be mentioned a third consideration which must be taken into account in explaining the imperfections of the early drawings of children; the fact, namely, that what one may call the "observing power" of little children is weak. They do not see many things in a given situation, and the few they do see, they see very imperfectly. Their images must of necessity, therefore, be vague, indefinite, and crude in every way. This fact, together with the lack of technical skill mentioned above, ex-

plain in large part the poor showing little children make in drawing.¹

Sixth Stage. — Beginning to copy models. An interesting theoretic question is, When does it first occur to a child that mere scratching and aimless scribbling is not really making the thing he says he is making? When does he begin to compare critically his own pencilings with the copy — either the real object or the copy set for him by others — and see that his own drawings or pencilings are unlike the models? When does he discover that swinging the pencil back and forth, round and round does not produce a thing *like* the copy? Put otherwise, when does the idea of representation begin to influence his marking? and when does he cease making conventional figures — circles, for example, to represent all sorts of objects? and when does he begin to make different figures to represent different objects? In looking through R.'s drawings for answers to these questions, one is unable to find anything to suggest that he tried to follow the copy before the first week of the twenty-ninth month, or that he showed any disposition to break away from the circular motion, the dominant one for all kinds of figures at that time. In the week named, he made a series of vertical lines in four different attempts to copy a triangle which had been drawn for him. But even this

¹ For full discussion of the psychology of drawing, see Sully, *Studies of Childhood*, p. 385ff.; also Baldwin, *Mental Development*, p. 83f.

was not so much an imitation of the figure as of the hand-movements made in drawing the triangles: he took but little notice of the figure before him. On the twenty-first day of the *thirty-first* month, the child made an unmistakable effort to copy an O which had been drawn for him. Circular figures had been made to stand for O prior to that date, but they had not been made with the care and deliberation which marked the making of O on the day named. Instead of the round and round pencil movement which was made usually in drawing all sorts of figures, the motion, on the latter date, was slow and painstaking, and the result, for unpracticed fingers, was good.¹ (See Fig. 5, p. 69.)

Seventh Stage. — *The gradual differentiation of forms and the appearance of a particular kind of figure to represent each of the child's favorite drawing subjects.* Beginning with R.'s thirty-second month the circular figure gradually came to be reserved to represent "O" and ball, while figures bearing some resemblance to one or more features of horses and men were drawn to represent those objects. For example, on the seventh day of the thirty-second month the child represented "Jack" (a horse) by first drawing a line more or less straight, then drawing a variable number of lines (representing

¹ This was the first appearance of the "tracery imitation" observed by Baldwin in his child's twenty-seventh month. See *Mental Development*, p. 86f.

legs) at right angles to and across the first line (Fig. 3, No. 4).¹ This was the second step in the process of differentiating his drawings. Figures were coming to have particular and special characteristics resembling more or less the original. For example, the lines in the drawing of the horse, as just stated, stand for legs, or "feet" as the child called them. Despite the obvious defects of this performance it was a notable step in advance, and marked the beginning of a process of specializing which was observable in all subsequent drawing. The nature of later changes which appeared in R.'s drawings can be described best in an account of the child's learning to draw a "man," and to that account we may now turn.

R.'S LEARNING TO DRAW "MAN"

The accompanying drawings (1-7, Fig. 2) represent the more important changes in "the pictorial evolution" of R.'s "man," beginning with the first week of the child's twenty-eighth month and concluding with the first

¹ See Sully, *Studies of Childhood*, p. 334, for reproduction, from Cooke's articles, of drawings of a "cat" which are practically the same as R. made to represent Jack (horse). It seems probable that in both cases the children were trying to represent the animal's legs, or the fact that the animal has legs. It does not seem unlikely that the little girl mentioned by Cooke, who was in her fourth year, aimed to convey the additional fact that the quadruped "cat" has *a great many* legs. At the time R. made the drawing reproduced here the idea "a great many" had not yet entered his mind.

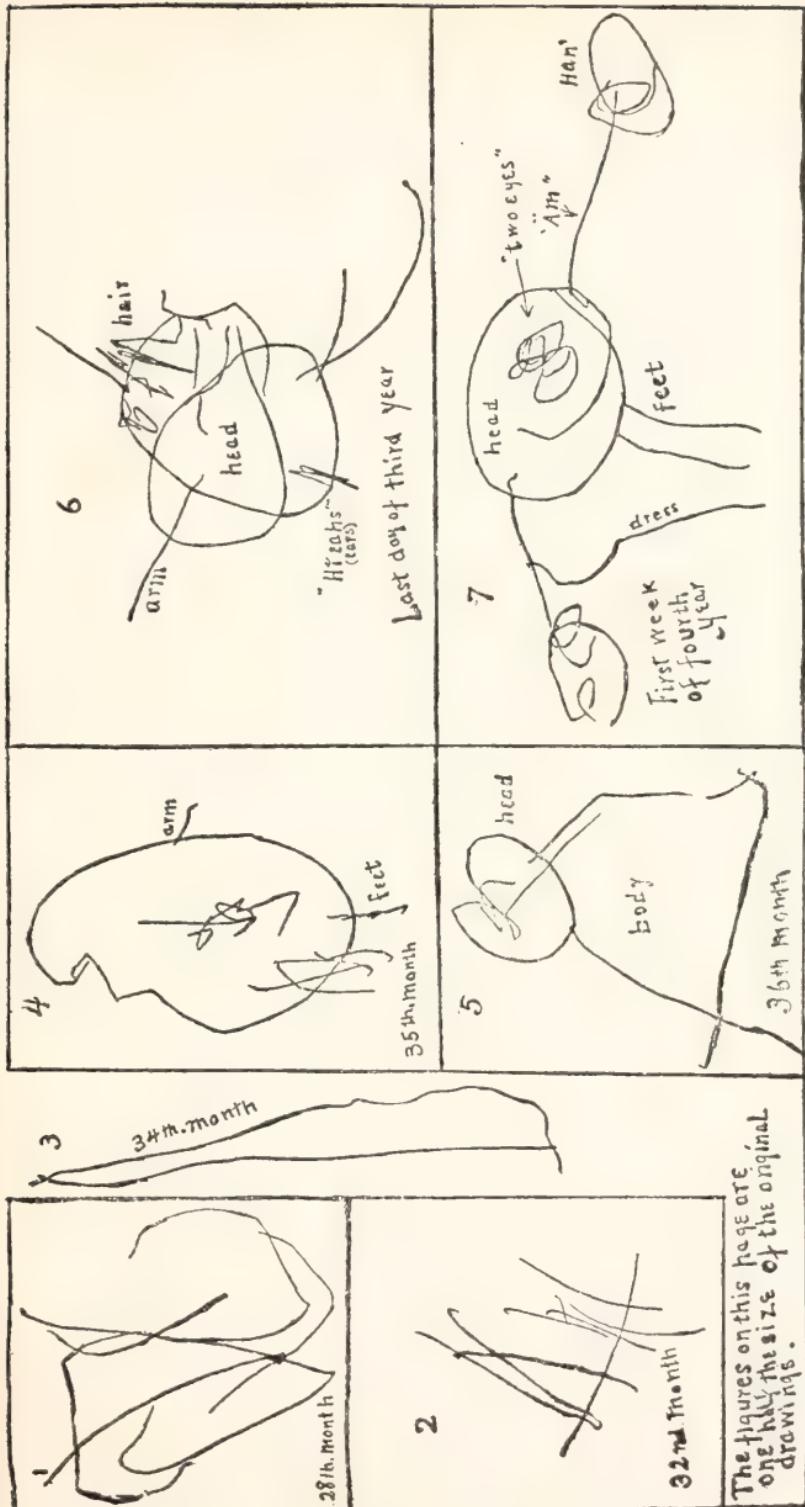


FIG. 2.

week of his thirty-seventh month, a period of nine months.

Most, though not all, of the drawings were made with the copy before him. (The copy, the "man" which was drawn for him consisted of a circular figure about an inch in diameter which stood for the head, or face; two small circles for eyes; a straight line for the nose, another for the mouth; a squarish figure with two attaching lines represented the body and neck; arms were represented by two straight lines, one on each side of the body; and two lines formed the legs.)

During the first four months of this period, when asked to make a man, the child drew either irregular circular figures or disconnected scrawls of which drawing No. 1, Fig. 2 is fairly representative. A change came in the second week of the thirty-second month when he began to make "man" by drawing lines at right angles to a base line (Fig. 2, No. 2). During the remainder of the thirty-second month, this figure—which was also, at that time, his favorite method of representing a horse—was made more frequently than any other in response to the request to make a "man." Another type of "man" appeared in the thirty-fourth month; namely, an elongated figure made by drawing two vertical, roughly parallel lines and joining them at top and bottom (Fig. 2, No. 3). When he first drew this figure it was supposed that he was trying to represent the legs. But after questioning him, I

concluded that he was trying to represent the figure as a whole; or rather he had caught the notion of enclosing an area by lines; that is, drawing a man meant — to him — enclosing a space with lines.

The first unmistakable attempt to represent some of the *parts* of the human figure was made on the fifteenth day of the thirty-fifth month. (See Fig. 2, No. 4, in which appear one rudimentary arm, and five legs. Parsimony in furnishing arms is more than offset by a generous supply of legs.) Drawing No. 5, Fig. 2, marks another advance. Although the smaller features are neglected, there is a clear advance in the differentiation of head and body. But the distinction was only for the day or moment. It did not appear again for many months. Fig. 2, No. 6, made in the last week of the third year shows the head, ears, hair, arms and legs. No. 7, Fig. 2, the last of this series, made in the first week of the fourth year, consists of a head, two eyes, two arms, two hands, two feet or legs, and a scanty bit of raiment, "dess," suspended from the right arm. This "man" was drawn from memory, without a copy.

An examination of the entire series of drawings of the human figure brings to light two characteristics which are found in every series of drawings (whether of man, horse, or "choo-choo") which ran through a long period. In the first place, it is noted that the advance from crude, formless scrawls to figures bearing some resemblance to

the original, the copy or the object, was not by any means a steady, forward movement. One was disappointed continually by the failures to make secure the progressive steps, by the frequent reversions, or lapses to earlier, cruder figures. For example, No. 5, Fig. 2, made on the nineteenth day of the thirty-sixth month, which gave such promise of forthcoming brilliant performances, was followed the next day by a lapse into characterless scribble, and a few days later that old primitive form — a base line with a number of lines drawn at right angles to it — was revived and offered as a "man." These lapses, which, as was said, were noted in every long series, were due in most cases to the caprice of the child or to indifference. In other cases, they seemed to signify an indefinite trying or experimenting for a more adequate means of representation. Apparently, there was a slight feeling of dissatisfaction with the drawing, and an accompanying vague, half-conscious desire to do something else, no great matter what.

Another characteristic, particularly of the drawing of the last months of the third year, was the tendency to pick out and draw a few features or parts one day and to select different ones on the day following. One expects that if, for example, the ears and arms of a man are drawn on a given day that they will be drawn on the next and succeeding days. But not so: ears and arms may be ignored entirely, and eyes and hair, which had been

neglected on the preceding day, will have a conspicuous place. In a word, in this period of incomplete representation of parts, it is a matter of chance which will be selected, depending, of course, upon what sort of ideas float into the child's mind.

General defects of early drawings.—The majority of the defects which characterize the drawings of little children (and also of primitive peoples, as Sully shows in his *Studies*, Chap. X) may be classed under the following heads: (1) incomplete enumeration of parts, (2) the parts which are represented are placed in wrong relations to one another, (3) there is little regard for the proportionate sizes of the parts drawn, (4) the child's representations of the several features of the copy bear little or no resemblance to the original. Closely related to the characteristic last named is the apparent disregard of the differences between the various parts of the things he is delineating. For example, the same general irregular ovoid stands for either eyes or hands (Fig. 2, No. 7); and a number of up and down scratches stand for either hair or ears, which—in either case—being suggested, not by any clear difference in the drawings of the parts, but by the position in the figure (Fig. 2, No. 6). Each class of imperfections just mentioned will be described briefly by reference to the accompanying drawings.

(1) *Incomplete enumeration of parts.*—The drawings of little children are characterized by incompleteness in

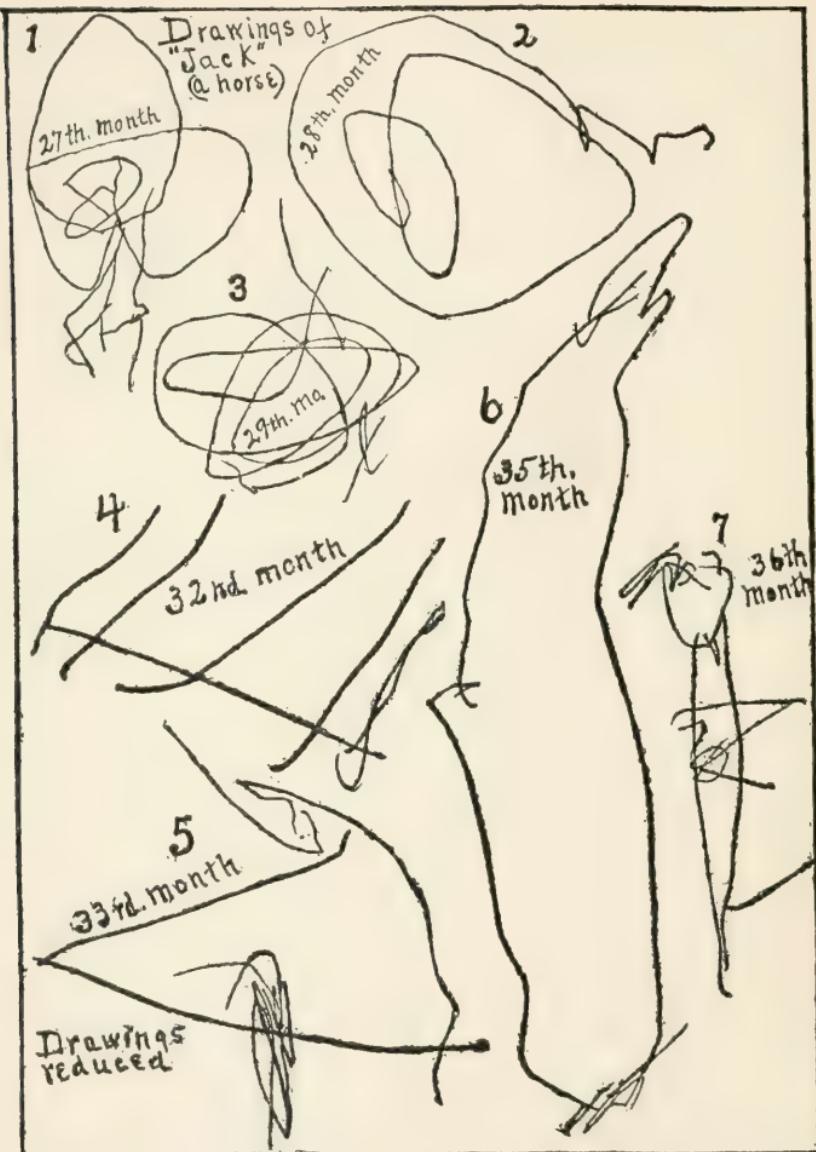


FIG. 3.

the number of parts drawn. A glance at R.'s drawings of a man, Fig. 2, will make this clear. Even the best drawing of the series—No. 7—omits trunk, mouth, nose, and neck, all of which were in the copies which had been made for him, and had been *named* by the child for more than five months. If it is said that incomplete enumeration of parts is a common defect of primitive drawing everywhere, it may be said conversely that progress in artistic ability involves, among other things, increasing care to represent all the features of the copy. It may be noted, further, that there is no relation between the child's ability to distinguish and name the features of the copy and his desire to represent them in his drawings. That is, the ability to recognize and name the several features of the copy is no warrant that when he "draws" he will try to represent the parts so recognized and named. In the early stages of drawing, knowledge of the names of the several features is far in advance of the desire to make them parts of his drawings. For example, on a certain day of his thirty-second month, R., when asked, what is that? accompanied by a pointing gesture to the different features of a drawing of a man, named the head, eyes, mouth, neck, body, arms and feet—then proceeded to draw a "man" like that represented in Fig. 2, No. 2.

This "scanty abstract treatment" in drawing when compared with the child's evident knowledge of the copy

and his ability to image it, leads Sully and others to the conclusion that at this stage the child's drawings are intended only as symbols. "The little artist," as Sully has it, "is still much more of a symbolist than a naturalist." The child's inability to execute manually what is in his mind is another factor which runs alongside other defects which are chiefly mental in character.

(2) *Wrong placing of parts.*—Of course, the child makes many ludicrous blunders in locating the several particular features of his drawings. The arms, of the "man," *e.g.*, are attached to the head, the eyes sometimes are placed clear outside the contour representing the head, and the mustache may be elevated to a position above the eyes. These blunders occur in most cases simply because the child does not think about the true relations of parts. In fact, the idea that there is a fixed relationship of parts which should be observed does not occur to him, and so has no place in his plan or idea of representation. And in those cases in which he does relate properly the different features, say of the human figure, it is not from his having taken thought about the matter, but merely because he follows the copy, and not the real object—the human figure, the horse, the "choo-choo"—what not. Of course, in drawing such a simple thing as a ball it seems likely that the image of a real ball influences his penciling even at a very early age. But when drawing a complex thing like a horse, "choo-choo,"

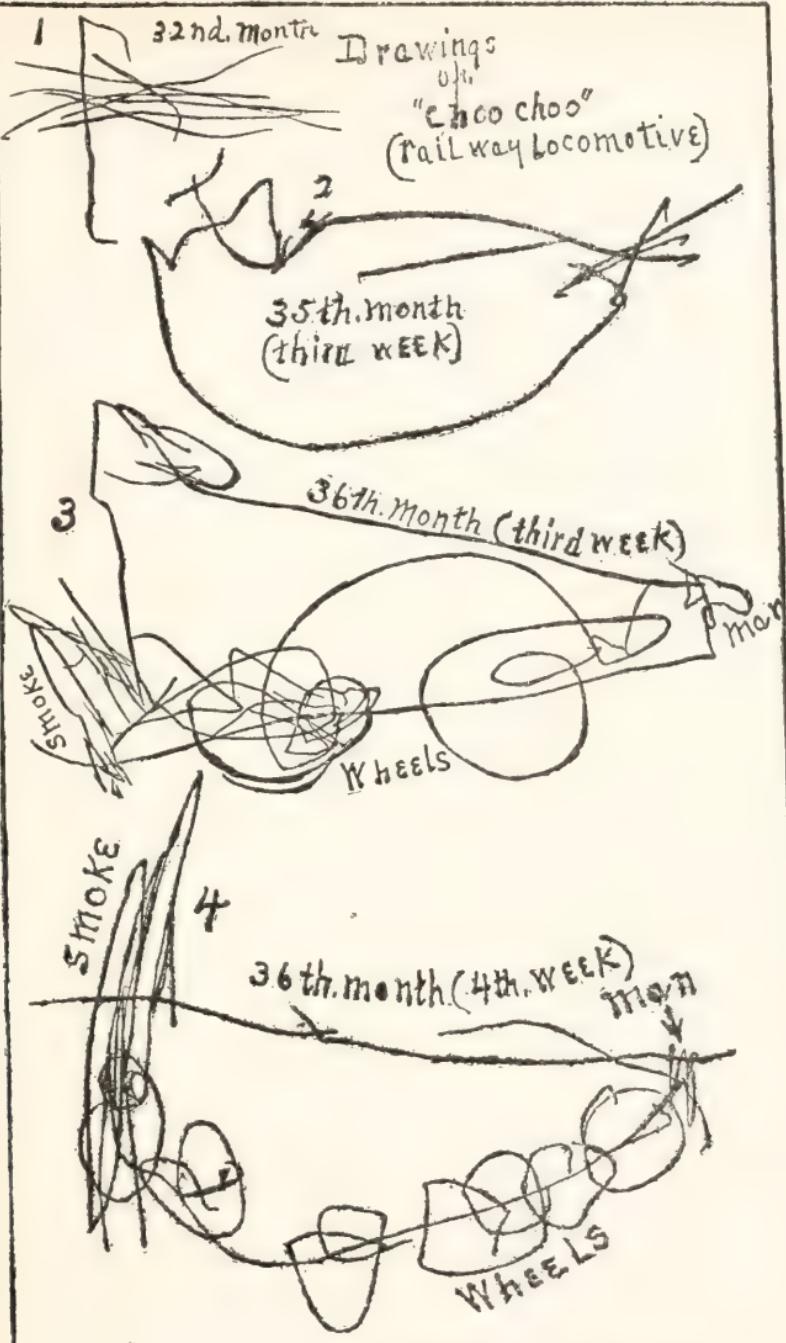


FIG. 4.

or human figure only a few features of the real object have impressed themselves strongly enough upon his mind, before the end of the third year, to affect his drawing. In all of R.'s early drawings there was a mixture of imitation of the teacher's copy and of parts or features suggested by what he knew of the real object he was trying to draw. Sometimes, usually, I believe, he was influenced largely by his memory of what the copy was like.¹ At other times, it was evident that he was putting in his drawing features which he knew belonged there even when they had not been in the copy.

(3) *Proportion.*—We have seen that the little artist has no thought or care about completeness in the enumeration of parts, and that he has no scruples about the positions assigned to the different parts. We find also that he is at no pains to maintain in correct proportion the sizes of the various parts of the figures he draws. At the earliest stage, the head is likely to overshadow all other parts, and for several years continues to be the most conspicuous feature in all drawings of the human figure. (See Fig. 2, Nos. 6 and 7.) In some drawings which belong to this early period the eyes are almost as big as the head, and in one of R.'s drawings, made when he was a few days past three, the two eyes taken together

¹ I say "memory of copy" meaning his memory of seeing the copy drawn, what was done, what movements were made, etc. He seldom looked at the copy after he began to draw.

entirely obscured the head which was itself very large. In the way of parenthesis, it may be said that the tendency of the drawing which I have observed was to make the parts as big as possible. That is, the child wanted to make everything on a generous scale. There was delight in making "big feet," "big eyes," and so on. And the fact that, as a rule, the head is made first, thus getting first choice of the available space accounts, in part, for the overshadowing proportions which it usually assumes. At any rate, it seems clear that it is not because the head is looked upon as vastly more important than any other part that it occupies so large a place in the early drawings of the human figure. As was seen above, the eyes are sometimes drawn on a scale of greater proportionate magnitude than the head; and Fig. 2, No. 7, shows enormous hands attached to delicate, reed like arms which give the impression of being utterly inadequate for the task imposed upon them. Here, as in the case of the other defects already described, the imperfections arise both from the child's taking no thought at all about the matter of accurate representation; and also from his lack of technical ability to execute what is in his mind.

(4) *Imperfect representation of the several parts or features.*—We have seen that it is only by virtue of a liberal construction that we are warranted in seeing in the child's early drawings resemblance to the things he says he is drawing. As wholes they are only rough copies.

When one passes to a survey of the separate parts or features, it is found that the drawing is equally crude. The gradual changes in the manner of drawing the different parts or features — for example, the eye, or hand, or mouth — what Sully terms “the gradual artistic evolution of the features,” — furnish interesting results on both the mental and motor sides. The manner of representing the human hand, for example, passes through a number of fairly distinct stages. Sully describes five of these, as follows: (1) lines drawn across and at right angles to the line which stands for the arm; (2) the claw hand in which the fingers are represented by a number of lines extending from the end of the arm, suggesting birds' claws; (3) the rake hand in which the fingers are attached, like teeth in a comb, to a line drawn across the end of the arm; (4) the burr hand, when the fingers are made to radiate from a central blur or patch which, presumably, stands for the hand; (5) a cactus hand which consists of an irregular circle to which are attached the outlines of a varying number of fingers.

It should be understood that Professor Sully derived his description of the artistic evolution of the hand from an examination of a large number of drawings, and it is not supposed that it represents the changes through which every child's learning to draw the hand passes. All that one can predict with confidence regarding the progress in a given child's drawings of any particular feature, as the hand, is that it will show a process of differentiation and specialization; that the progress will accord,

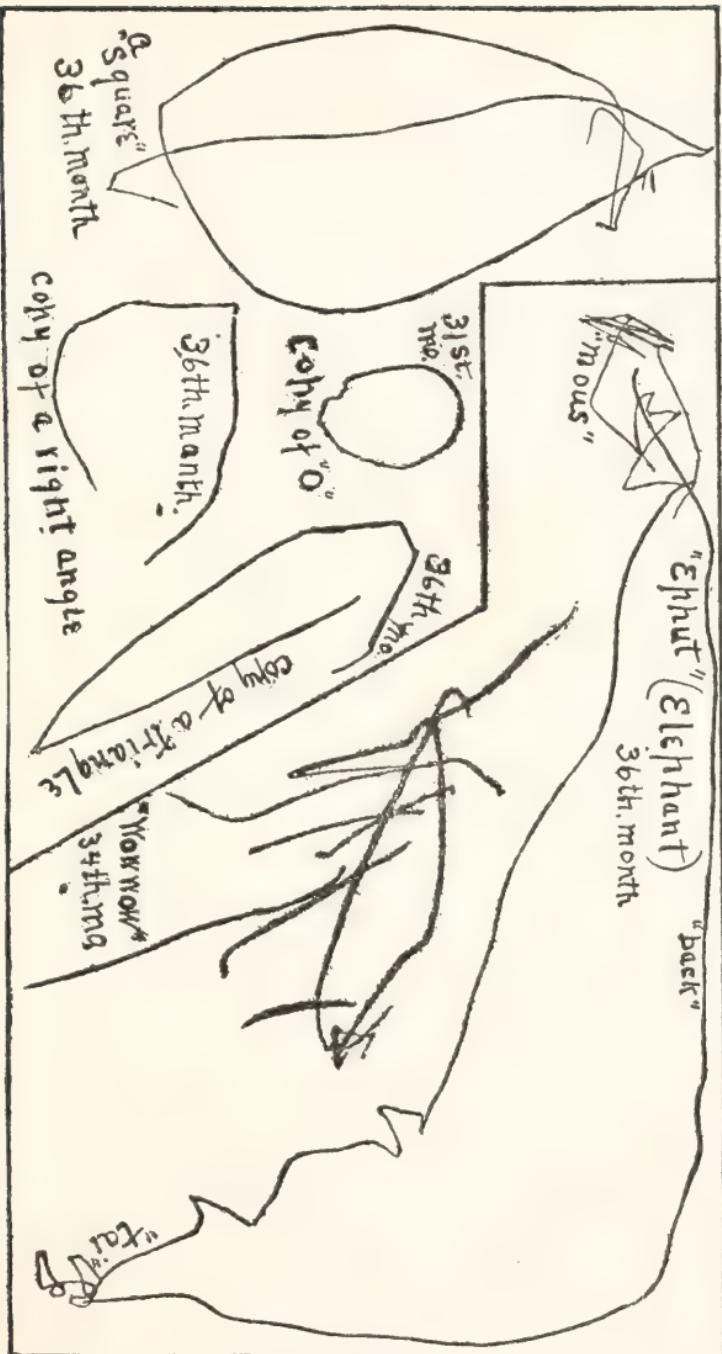


FIG. 5.

in a general way, with Spencer's formula for the process of evolution, "change from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity"; that there will be additions of parts, a filling in of details, and a gradual improvement in the manner of delineating the details.

In a series of drawings which does not extend beyond the end of the third year (such as accompanies this review) the changes in the manner of representing the various features of this or that figure are too few to afford any suggestion as to the direction which later changes will take, or as to what principles will control the pictorial evolution of this, that, or the other feature. But we may stop for a glance at the ways in which some of the features are first represented. Turning to R.'s drawings of a "man," Fig. 2, it will be seen that the "eye" is represented by a large, crudely made ovoid; the arm, by a straight line; the hand by a large circular figure bearing no resemblance to a human hand; the feet or legs, by two straight lines extending downward from the head; hair and ears by a number of short lines scratched on the irregular circular figure which represents the head. Some of these methods of representing particular features were suggested by the copy with which he had become familiar; others were of the child's own invention, *e. g.*, the "hand" in Fig. 2, No. 7. Not only was the manner of drawing the "hand" original with the child, but the idea of drawing it at all was his own. For the hand was

not shown in the copies which had been made for him; nor was "hand" suggested as a thing needed to complete the figure. It will be observed that there was yet no attempt to represent the fingers.

Fig. 3, page 62, represents seven stages in R.'s learning to draw a horse; Fig. 4 shows four stages in the evolution of the locomotive ("choo-choo"), and Fig. 5 contains a miscellaneous collection of R.'s drawings,—an elephant, a "wow-wow," a triangle, a right angle, a square, and an O.

CHAPTER IV

THE FEELINGS AND THEIR EXPRESSION

WE mean by "feelings" the pleasant or unpleasant, agreeable or disagreeable aspects of our mental experiences. We describe sensations, say of smell or taste, as agreeable or disagreeable; and certain ideas, as of the loss of friends, as painful, or the thought of possible future good fortune as pleasant. Very often the feeling factor or aspect of a mental process is so prominent that it obscures its sensational or ideational basis, and then the process is named according to the nature of the feeling element. Thus we have mental experiences which we call joy, grief, fear, anger, hope, surprise, pity, in which the affective or feeling factor is so large that the cognitive and volitional factors are overshadowed.

Psychologists usually classify feelings either according to their dominant tone as pleasant or unpleasant; or, according to the presentative bases accompanying their appearance, as sense-feelings and idea-feelings, or emotions. Sense-feelings arise in connection with sensations of heat, cold, taste, smell, color, sound, and so forth. Emotions or idea-feelings are experienced in connection with ideas and idea-complexes, and are known as joy, grief, anger, fear, love, hate and so on. Sense-feelings



1



2



3



4



5



6



7

PLATE II.—1. THROWING STONES ON ICE TO SEE THEM GLIDE.
2. GRIMACES WHEN UNABLE TO RECALL THE NAME OF A CARD.
3. FEAR OF FALLING. 4 AND 5. POUTING. 6 AND 7. SHOWING
POSITION OF THE HAND IN REACHING AT TWO DIFFERENT PERIODS
—10TH AND 29TH MONTHS.

are distinguished from idea-feelings by the fact that the former arise in connection with the peripheral stimulation of the sense-organs while emotions are said to be centrally excited. The sense-feelings are still further marked off from the emotions by the fact that the former involve a relatively small part of the organism, while the latter affect more or less the whole organism — the muscles, the organs of circulation, of respiration and digestion, of secretion, and, in some kinds of emotion, the lachrymal glands conspicuously. The emotive reaction is said to show itself in a greater number of the parts of the nervous system than the sense-feeling reaction.

Sully groups the emotions into three general classes "according to the order of appearance." To the first class belong "certain unspecialized manifestations of pleasurable and painful feeling, which are best described by the current terms, joy and grief." These emotive states involve a minimum of representation, and so come nearest to the sense-feelings. "All they include is the representation of a pleasurable or painful experience *just over* . . . and the representation of such an experience in the immediate future through the suggestive force of present precepts." (2) Next in order of appearance and of complexity of presentative basis come the specialized forms of emotion, such as anger and fear. These, as Sully observes, are experienced by all the higher animals and may be marked off as the "Animal" emotions. (3) A third order of emotions is characterized by a high degree of the representative or ideational element. To this latter

group belong sympathy, and the so-called abstract sentiments of the true, the beautiful, and the good. This classification corresponds, so Sully believes, with the general order of development of the emotions in the individual and the race.¹

Keeping in mind the classification of feelings into, (1) sense-feelings, and (2) idea-feelings, or emotions, we may now consider some of the more prominent aspects of the feeling life of infancy and early childhood.

(A) SENSE-FEELINGS

Feeling and its expression occupy a large place in the infant's activities. The early months of the normal baby's life yield a multitude of expressions which uncritical observation looks upon as signs of comfort or discomfort, of pleasure or pain, of joy or grief.² According to common belief the baby is a bundle of feelings. This is to say that the child's states — whether

¹ Sully, *The Human Mind*, New York, 1892, Vol. II, p. 84ff.

² It is of interest to note how variously these early expressions have been interpreted. The first cry, for example, to Kant was a cry of "indignation and aroused wrath"; to Schwartz, a "shout of joy"; and to Semmig, who reached the climax of poetic interpretation, the first cry was "Heavenly music . . . sacred voice of life, first sound of the poem of a heart, first note of the symphony of human life, thou echo of God's word! . . . Oh, cry of the baby in the night, nightingale song for mother and father!" (Quoted by Miss Shinn, *The Biography of a Baby*, p. 21.) On the other hand, the man of science is disposed to regard the first cries as only "pure reflex effects" (Preyer), or as "automatic affairs" (King) and to look upon them as entirely lacking in emotional significance.

of pleasure or of pain, of joy or grief, of anger or fear — are free and unhampered in their expression ; that the child's feelings express themselves in highly demonstrative ways, that a painful sensation or idea — even a mild one — makes a great commotion in the child's organism. On slight occasion he breaks out into crying or into peals of laughter ; he is tickled, and injured as well, with a straw. He thinks little, his understanding is simple and unschooled, of deliberation he knows nothing, and popular speech describes him as the creature or plaything of his feelings.

Feelings of pleasure.— The baby's pain-expressing apparatus seems to be more highly developed at birth and in the early weeks than the apparatus for expressing pleasure. The baby's expressions of comfort and well-being, when compared with those of discomfort, are mild and unnoticeable. The biological reason for this difference is that in the early stage it is more important that the baby's attendants should take cognizance of his unpleasant than of his pleasant states. So it is found that the early weeks do not furnish strong outward signs or demonstrations of the comfort the child probably feels. And yet there are a few changes, particularly of facial expression, which one can note unmistakably, and which, if they were seen in the adult, would unhesitatingly be called pleasant. For example, some stimuli are followed by a clear lightening of the face, the customary

anxious or pinched look of the face gives way to an expression distinctly brighter and easier, the eyes are opened wider, the muscles are relaxed, and if there is no smile there seems to be all readiness for it.¹

How much, if any, conscious value the baby's first expressions of pleasure have we cannot know. They may be, probably are, in the first days, mechanical responses of the organism, and entirely lacking in conscious concomitants. But we are sure that almost from the moment of birth certain kinds of stimuli call forth expressions of comfort and discomfort, that the organism responds uniformly in a characteristic manner to various sense stimuli. One kind of stimulus is followed by a grimace, by shrinking, or an outburst of crying, while another is followed by a calm expression, by open eyes, and a general expression of comfort and satisfaction.

Leaving aside the unanswerable question as to the nature of the mental concomitants of the earlier feeling-expressions, or whether, at first, there is any mental associate at all, it may still be said that pleasurable expressions soon appear, (1) in connection with the moderate stimulation, if not too prolonged, of the child's

¹ It may be said that almost from the first it is possible to distinguish three kinds of feeling expressions: first those which are unmistakably painful, as the various kinds of crying; second, the native shriveled, pinched, anxious, or even distressed look the average baby wears for the first few days; third, the lighter, calmer, easier expression which follows agreeable stimuli of any sort.

sense-organs.¹ (2) Pleasure accompanies the free, unhampered gratification of the child's original impulses, such as the instinct to clasp and cling, to play, to walk and so on. (3) Expressions of pleasure appear, also, in response to the laughing prattle of the child's associates. The organism seems to be tuned to respond in a characteristic manner to the happy manners of other persons, though there are many exceptions casting doubt upon the general validity of this statement.

It seems likely that the earliest pleasant feelings arise in connection with the food-taking process, with the sensations of touch, temperature, and taste. Thus, on the third day, I noticed that when R. took saffron tea from a teaspoon his face assumed an expression decidedly more pleasant than that which preceded or followed. A similar easier, brighter expression came over his face on the following day when he was allowed to suck a piece of sugar, and when given a few drops of Castoria, or a few drops of brandy in water. Whether or not the lighter expression on the baby's face represented a definite feeling-tone is, of course, open to question. It may have

¹ In order to call forth signs of pleasure, a stimulus must have, besides a certain intensity and duration, a certain quality or character. Moderately sweet tastes, for example, are pleasing, while bitters and sour are disagreeable from the first. . . . But see *Zeitschrift für psy. und phys. der Sinnesorgane*, Bd. XXVII, Heft 1-2, for report by Sternberg upon the taste sense of an anencephalic infant that responded with a pleased expression to sweet substances and with expressions of dislike to sour, bitters and salts.

been a mere organic response, entirely lacking in "conscious value." Other experiences of the first month which seemed pleasing were: Being washed in warm water (fourth day); the sight of a blue shade over a gas-light (sixteenth day); having his hand and arm shaken playfully (twenty-fifth day). The last named experiment was made a number of times in the last week of the first month and invariably called forth broad smiles and a strongly marked expression of pleasure. My notes on pleasure producing stimuli for the *second* month all relate to the effect of laughing prattle as one played with the child. If the child was in comfort this always called forth smiles and vocal utterances which were a kind of primitive laugh.

In the *third* month, R.'s pleasure in looking at brightly colored objects became more pronounced. On the fifth day of the month, brightly colored tassels dangled over the child evoked broad smiles and wriggling, the latter being a forerunner of reaching toward and grasping. On the same day, the swinging motion of a basket in which he lay caused pleasure. On the ninth day, the bath in a tub of warm water was distinctly pleasing in its effects. On the eleventh day, the child enjoyed rubbing his hands over a fur coat which was laid in front of him as he sat propped up in his crib. As in the preceding month, lively talk and prattle called forth smiles.

The notes for the *fourth* month make it clear that the

child's manner of expressing his feelings of pleasure had become more demonstrative and energetic. Instead of the calm, placid, slightly brighter expression of the first month when plied with pleasurable stimuli, we now have broad smiles and crowing, or if the pleasure is strong, laughing outright. (The first real laughing sound was heard on the twenty-third day of the fourth month.) The arms and legs are beginning to play a prominent part in the expression of pleasure. Throwing the arms up and down and rapid kicking were unmistakable signs of the child's pleasure in brightly colored objects. Besides being signs of joy at the sight of objects, it seems likely that the arm throwing and kicking are also indicative of a desire to get hold of the objects. They were developments from the slight wriggling motion noted in the preceding month, and were soon to develop into striking toward and fumbling over desired objects, as a watch or colored tassels which were held over him for his entertainment.¹

By the middle of the *fourth* month, grasping had been acquired and its exercise was accompanied, no doubt, by pleasure. Paper shaking and tearing was another source of pleasure which appeared in the latter half of the month. Expressions of pleasure which appeared in subsequent

¹ It does not seem fanciful to think of the first wriggling, the arm throwing and kicking, the striking at, and finally reaching for and grasping as parts of the same developmental process.

months will be described in the section on Play, and in later paragraphs of this section.

Unpleasant feelings.—Expressions of the disagreeable or painful arise (1) whenever the sense-organs are over-stimulated; when the stimulus is too strong, or too prolonged; (2) when a pleasant sense-experience is interrupted; (3) when the child's instinctive impulses are crossed, delayed or denied free movement, as when making an unsuccessful effort to get the breast, or when it escapes from his mouth, or when one pulls as if to take away from the child an object—one's finger, *e. g.*, which he has been allowed to grasp. (4) Painful expressions also appear in the presence of unwonted, or strange stimuli. Habit begins very early in the life of the child to show itself as a source of "negative pain"; that is, the pain arising from disturbing the child's daily round of familiar impressions. (5) We saw above that some stimuli are by nature distinctly pleasing to the infant. It is found also that certain qualities are distinctly unpleasant or painful. Pungent odors, bitter tastes, injury of parts of the body containing nerve fibers are unpleasant and often painful.

In order to indicate the occasions and to describe the nature of the unpleasant or painful feeling expressions of the first month, I cannot do better than transcribe my note-book entries. (*First day*) The first crying was the reflex crying just after birth. Three hours later when

given a thorough washing the child cried so hard as to alarm all but the nurse who had learned from experience that energetic protests are to be expected when the baby is given its first bath. (*Second day*) The child uttered a fretful, whimpering cry when unable to seize the breast or when it escaped from his lips. (*Fourth day*) A well marked grimace appeared when the child's lips were touched with a spoon containing cold water. The reaction may have been due either to the coldness or to the strangeness of the new touch. (*Fifth day*) Handling, "feeling" or holding the child's hands called forth a whimpering cry as if to say, "let my hands alone, please." A ludicrous show of fretful impatience appeared when one allowed the child to grasp one's finger, then pulled as if to take it away from him. If one continued to pull he broke out crying. (*Sixth day*) A grimace not unlike that of the fourth day appeared when the child was given cool water from a spoon. (*Sixteenth day*) A slight surgical operation caused violent kicking and screaming. Evidently the child suffered great pain. (*Twenty-fourth day*) The child was startled and half frightened when given his first tub-bath. The child shrank from the water as it was poured over him, but did not cry out. On the same day he was startled by loud whistling, by a door's slamming, and by the falling of a trunk-lid in an adjoining room. (*Twenty-seventh day*) The child was easily frightened or startled by sudden or

strange sounds ; and a very slight noise, if new to him, caused the face to "pucker" as if to break forth crying.

Second month. — One's desire to ply the child with all sorts of stimuli in order to see his reactions to them is checked by the fear of doing the child harm. One shrinks from the suggestion to try the effects of bitter tastes or pungent odors unless they fall in the way of the dietary or medical programs laid out by doctor and nurse. So science must keep a lookout for the incidental results, the by-products, as it were, of the regular and hygienic treatment of the baby. In this way, was obtained the only new instance of pain reaction during the second month, as follows: — a bottle containing liniment was accidentally held too near the child's nose. He first made a wry face then broke out crying. Whether the pungency of the fluid caused pain, or whether he cried because he was startled one cannot be sure ; but that it was disagreeable there could be little doubt, and that is the significant thing in this connection.

In the *third* month, only two instances of displeasure were noted: once when the child was taken away from a window from which he had been watching moving objects, and a second when a tin cup, held near him, was rapped rather sharply.

The only notes I have on expressions of displeasure in the *fourth* month relate to the child's impatience when unable to reach a desired object, or when he was not al-

lowed to handle certain articles. Thus on the sixth day of the month he was distinctly displeased when a toy which he was holding and fumbling was taken from him. On the twentieth day, his inability to reach a watch and a cluster of tassels which were held over him called forth a fretful cry. Again, marked signs of displeasure appeared when, on the twenty-third day, a lot of paper which he had been shaking and crumpling was taken away from him. Similar fretful cries of disappointment arose when a sheet of paper with which he was playing fell out of his crib and beyond his reach. Other and later instances of unpleasant feelings will be noted in the paragraphs dealing with Fear and Anger.

(B) EMOTIONS

Having in the preceding paragraphs described some of the early forms of pleasure and pain and their expression, we may proceed to the consideration of some of the simpler forms of emotion, particularly fear and anger.

FEAR

Fear may be defined as the emotive reaction which accompanies ideas of harm or danger. Genuine fear is marked off from surprise, and mere physical or nerve shock by the fact that it involves a sense of danger, an image of possible harm not present in the sudden

physical shock or surprise, and also by its longer duration. Each particular experience of fear differs, no doubt, from every other in intensity of commotion, in the degree of disturbance, and in the number of somatic and mental factors involved. The reactions when in the presence of imaginary supernatural forces, when one is exposed to a violent storm, the fear of being slain in battle, fear of a ferocious beast, of falling from high places, the disquiet one experiences in a dark wood or cave—all differ somewhat; but in every case it is possible to enumerate factors common to all, such as disturbance of the respiratory, circulatory, and certain glandular functions, the tremor of certain muscles, the skin pallor, the full throat, and so forth.

It is extremely doubtful whether infants experience true, or genuine fear as described in the preceding paragraph, during the first year. In its earliest form the fear reaction, in its motor aspect, cannot be distinguished from the mechanical, reflex starting in response to loud or sudden stimuli. Concerning the "feeling" side of fear during the first year, we know nothing, and can only say that if it is present at all it is not distinguishable from the mass of general unpleasantness the child seems to suffer in the early months. But the well-known tendency of grown persons to confuse their own standpoint with that of the child, to read their own experience into the expressions of little children, often leads them into the error

of attributing feelings and emotions to children which they do not in the slightest degree experience. And observers are particularly liable to make this error with respect to fear because of the striking similarity between the genuine fear reaction and the merely organic response to nerve shocking stimuli. And yet reflection will make plain that if fear involves a definite idea of possible evil or danger (as true fear doubtless does) then it is clear that the babe of three or four months cannot experience fear for the reason that he cannot have the necessary definite ideas of danger. Very many of the expressions and responses which are often supposed to have emotional value are only instinctive and organic responses to disturbing stimuli, and have little emotional value from the child's standpoint; they mean little to him, they do not express for him a definite conscious content or process. The apparent emotional response is mainly an organic reaction along the line of least resistance.

King has developed the unstable-nervous-system-least-resistance theory of the early fear expression, as follows:¹ "The child has inherited a small number of motor coöordinations, of an instinctive type, and in these the tensions resulting from any unwonted or strong stimulus are apt to find easiest relief." What the particular form of the reaction to an exciting stimulus shall be is a matter

¹ *Op. cit.*, Chap. IV.

of indifference and of guesswork so far as prediction is concerned. But other things equal, the reaction to unwonted stimuli "would tend to occur through the motor channels offering the least resistance; that is, through the ones traveled oftenest." Whether the baby will respond with smiles and laughter or with a fit of crying to a given stimulus cannot be predicted beforehand, and the same stimulus may call forth directly opposite reactions on two different occasions.

According to this theory, a nervous, sensitive child, a child whose nervous system is in a state of unstable equilibrium, a child who has suffered much physical pain is more likely to show fear than a child having a sluggish nervous organization, or one whose nerves have never been racked by pain. All observers of children will agree that the facts are in harmony with the theory. A child who has suffered much is likely to be timid and fearful until he is fully restored to rugged health; he is more likely to be disturbed by situations and experiences which are viewed with calmness and unconcern, or even passed by unnoticed, by his healthier or more phlegmatic playmate. And adults know very well that, as a rule, physical and moral courage rise with physical comfort and well-being and fall with physical pain and discomfort, if prolonged.

There are two general causes of the fear-reaction in little children: first, strange and powerful sense-im-

pressions which, as a rule, act as a shock or jar to the unstable nervous system, and which at times also arouse a vague apprehension of danger which shades imperceptibly into definite ideas of possible harm giving rise to fear proper. The ideas may be the result of individual experience or may be learned from others. A third general cause of fear has been advanced by a number of writers,¹ namely, heredity. Biologists and psychologists working under the inspiration of a certain form of the evolutionary doctrine have maintained that children inherit definite tendencies to fear certain things, such as strange animals, the dark, black things and dark places, falling from high places, the supernatural and so forth. But more careful observation and reflection cast grave doubts on the soundness of the hereditary fear theory, particularly the theory that children inherit fears of definite things. And mainly for the reason that children simply do not fear the things the theory requires, and they do fear things for which there is no possible explanation or justification from the standpoint of those who hold to the hereditary origin of fears. Moreover, all children do not fear the same things ; things which frighten one child often give another the greatest pleasure. To many children — perhaps the great majority — a thunder- and rain-storm is fearful, but we remember that the boy Walter Scott was found during a

¹ Notably Dr. G. S. Hall. See his study of Fear, *Amer. Jour. of Psychol.*, Vol. VIII, pp. 147-249, particularly the latter part.

thunder-storm lying on a knoll taking the greatest delight in the lightning play;¹ and Preyer says that his boy "laughed at the thunder and lightning" (in the eighteenth and nineteenth months); and that "another child even in the thirty-fifth month did the same, and imitated cleverly with the hand the zigzag movement of the lightning." Still further, it is well known that the same child will react differently to the same stimulus on two different days, or even at two different hours of the same day. There is in fact no fixed uniformity of response to fear producing situations either among children as a class or among individual children. If instinct or heredity is to be brought in to explain fear reactions it will have to be stated in much more general terms so as to explain the fear of vastly wider groups of phenomena than lightning, fury animals (see page 114), the dark, persons dressed in black, and the like. It seems more probable, as Sully and others have suggested, that since the little child's unstable nervous system is easily disturbed by powerful or novel stimuli, most of the so-called fears of the first year or two can be accounted for by reference to the suddenness, strangeness, or volume of the sight and sound impressions which reach the child.

(a) SOUND FEARS

Observers of infancy agree that among the earliest fear

¹ Quoted by Sully, *Studies*, p. 196.

reactions are those caused by loud and sudden noises, such as are made by the banging of doors, the falling of articles of furniture, or by striking a bell a sharp blow. Miss Shinn states that her niece had her first fright in the fifth week, "when her tin bath was brought in and set down rather roughly so that the handles clashed on the sides."¹ The reaction was a violent start, a sharp cry, and "the regular crying grimace." Considerably earlier, nineteenth day, R. was frightened, so it seemed, by ringing a small breakfast bell near him as he lay nursing. At first he stopped sucking, held his breath for a moment, then broke out crying. Again on the twenty-fifth and twenty-sixth days, whistling brought a pucker or grimace, as if about to begin crying. In these cases we have to do not with the emotion of fear, strictly speaking, but, as Sully observes "with an organic phenomenon, with a sort of jar to the nervous system."

"To understand this," Sully continues, "we have to remember that the ear in the case of man at least, is the sense-organ through which the nervous system is most powerfully and profoundly acted on. Sounds seem to go through us, to pierce us, to shake us, to pound and crush us. A child of four months or six months has a nervous organization still weak and unstable, and we should naturally expect loud sounds to produce a disturbing effect on it."²

¹ *Biography of a Baby*, p. 81.

² *Studies of Childhood*, p. 197.

These first fear reactions then are of the nature of reflexes and so may be regarded as the forerunners of true fear. They are classed as fear reactions because they resemble so closely the true fear response which appears somewhat later.

We have just seen that the loudness and the suddenness of sounds make them startling to little children; we have now to note that somewhat later strangeness becomes even more disconcerting than loudness and suddenness. Darwin¹ relates that,

“Before the present one (child) was four and a half months old I had been accustomed to make close to him many strange and loud noises, which were all taken as excellent jokes. But at this period I one day made a loud snoring noise which I had never done before: he instantly looked grave, then burst out crying. Two or three days afterward I made through forgetfulness the same noise with the same result.”

A similar example of the disconcerting effect of a strange noise is given by Preyer, as follows:

“In the sixteenth month my child was afraid (to my surprise for I thought to please him), when I drew tones of high pitch from a drinking glass by rubbing with the finger, as I had done once at an earlier period. His fear which did not at that time — in the third month — appear, now increased to the point of shedding tears, whereas the ring of the glasses when struck was greeted with joy.”

¹ *Mind*, Vol. II, p. 288 (1877); also *Pop. Sci. Mo.*, June, 1900 (reprint).

On the sixty-eighth day, R. was frightened by the strange sound made by gently tapping on a tin cup; and even as early as the last week of the first month *strangeness* seemed to be a factor of fear-producing sounds. As was indicated above, strangeness *alone* did not cause fear until the child had almost ceased being frightened by the mere loudness and suddenness of sounds. But fear of strange sounds involves a mental factor as well as the physical one of shock or nervous jar. Thus in the last week of the sixth month, R. had a great fright at the sound of a lawn mower. At the first sound of the machine he made up a face to cry; the machine was stopped and the grimace faded; but when the mowing was resumed he burst out crying and had to be carried away before he could be quieted. In the twenty-fifth week, I tried the effect of gruff speaking to him as he lay in his crib, but there was no fear. The response was similar to that made to many strange noises, but it did not show fear—rather half surprise or wonder.¹ In the same week (twenty-fifth) the child was taken to a Union railway station where he met a great many new sights and sounds

¹ At the same time, and on a number of days in the course of the next month, I leaned over the child and made a scowling face to see if it would cause fear or any change of expression. The results lead me to think with James that, "It seems very doubtful whether young infants have any instinctive fear of a terrible or scowling face. I have been unable to make my own children, under a year old, change their expression when I changed mine; at most they manifested attention or curiosity" (*Principles of Psychology*, Vol. II, p. 404).

where the great din and clatter of moving trains, ringing bells and whistles might well be expected to throw a baby into a panic. But the whole situation produced only wide open eyes, turning the head hither and thither, and a general expression of great interest or wonder. Only once, and then when too near a hissing engine, did the child show signs of fear or alarm. On two different days in the last week of the *tenth* month the child was allowed to sit in his carriage within thirty feet of a railway track as swiftly moving trains passed. On both occasions the child's expression was that of being interested, but not a particle of fear or alarm appeared. The shrill whistle of the engine as it approached the crossing caused the child to start and look frightened for a moment, but he did not associate the sound of the whistle with the engine and he was instantly lost in wonder at the sight of the approaching train.¹

Volume, or bigness, of sounds is mentioned by a number of writers as a quality which tends to make them fearful. Adults as well as children often feel a vague alarm or uneasiness at the roar of a storm, the firing of heavy artillery, the noise of a big factory, the din of a city street, the noise of great volumes of water rushing over a precipice, as at Niagara, mainly because of the overwhelming nature of the sounds produced. In these

¹ Sound as one factor in making a thunder- or rain-storm fearful will be referred to in a later paragraph.

cases the immediate effect is physical rather than mental, the very bigness of the noise pounds, overwhelms, crushes one, producing a "panicky" feeling although one may be well aware all the while that the feeling is groundless.

Sully and Preyer think it likely that unexpected sounds, or sounds of unknown or mysterious origin are likely to produce fear or vague alarm and apprehension. "There is something uncanny to the child," so Sully believes, "in the very production of sound from a silent thing. A banjo lying now inert, harmless and then suddenly firing off a whole gamut of sound may well shock a small child's preconception of things."¹ There seemed to be a slight degree of alarm at the mysterious and unexpected in the fear which Champneys' boy showed of an unusual sound in his room. "The first symptom of fear," says Champneys, "was noticed at about nine months. It was excited by an unusual sound in the room, but not in the child's immediate neighborhood; he opened his eyes very wide and burst out crying."² So also the Champneys child's fear (tenth month) of a toy which squeaked when pressed was due in part to the unexpected and mysterious nature of the sound produced. The child burst out crying at the squeak of the toy and cried whenever it was offered to him, but in a short time he got used to it and enjoyed making it squeak himself. In R.'s

¹ *Studies*, p. 196.

² *Mind*, Vol. VI, p. 106.

third year, the latter part, he often stopped suddenly at the sound of a strange noise, looked startled, eyes wide open, and asked quickly, "fat-iss-noise?" *i. e.*, what is the noise? His expression was mainly one of interest or curiosity, though there were on a few occasions signs of vague alarm as at the sound of blasting rock in a quarry not far distant and at the screaming of fighting cats.

(b) FEAR OF VISIBLE THINGS

We have seen that the first fear responses are reflex and not to be distinguished from the response to a physical shock or jar. It was said also that the earliest fear-reactions are produced by sounds, that the fear expressing apparatus is first set in motion by auditory stimuli. Not only are the earliest fears produced by sounds, but sound is the most fertile source of fears in adults as well as in children. The explanation seems to be, in part, that, in every day affairs, sound waves more frequently produce physical commotion than does any other class of stimuli, light waves for example.

In order to explain the earliest manifestations of fear excited by visual sensations we have to call in our old categories of novelty, surprise, intensity. The things seen which cause fear have one or more of these qualities. Miss Shinn states that her niece experienced her first visual fear in the fourth month, when "a caller was present, dressed in black" which to the child was an un-

usual sight. When R. was thirty-three days old I made the experiment of leaning over him in a dim light when he could not see what or who I was. At once his face assumed an expression of apprehension or alarm, breathing was partially suspended, but the fright was not great enough to cause crying. Darwin tells of a similar experiment with his child when he was about four and a half months old: "I approached with my back toward him and stood motionless: he looked very grave and much surprised and would soon have cried had I not turned around."¹

Powerful visual impressions like the vastness of the sea, or a great conflagration, or a great dust or snow-storm produce feelings of apprehension closely akin to fear. Thus Preyer's child in his twenty-first month, "showed every sign of fear when his nurse carried him on her arm close by the sea. He began to whimper," Preyer continues, "and I saw that he clung tighter with both hands, even during a calm and an ebb-tide when there was but a slight dashing of the waves."² Sully's correspondents sent him a number of cases of what seemed instinctive dread of the sea. Others reported cases of imaginative children in whom the vastness of the sea awakened apprehension and alarm.

We saw above that habit comes very early to be a

¹ *Mind*, Vol. II, p. 288.

² Preyer, *Op. cit.*, Vol. I, p. 170.

negative cause of unpleasant feelings ; that is, that changes in the child's surroundings, associates, personal habits are likely to be displeasing. The principle has a variety of illustrations in the early fears of children, and is sufficient to explain most of the early sight-fears. Examples of fears which may be explained by reference to this principle are : (1) Change of place ; a child long accustomed to a given room or set of rooms is likely to feel uncomfortable or ill at ease on being taken to a new room entirely unlike the old one in its appearance and furnishings, though some children are interested and pleased by the new surroundings. Sully tells of a little girl who at the age of four months when taken into a new nursery, "looked all around and then burst out crying"; and of another child that "retained up to the age of three years, eight months the fear of being left alone in strange hotels or lodgings." Perhaps this is like, in some respects, the disquieting effect of the busy city thoroughfare upon one accustomed to the quiet of the country.

(2) Change of apparel either of his own or of others often causes a dislike having some of the elements of fear. Sully says that C., "when an infant was distressed to tears at the spectacle of a new color and a new pattern on his mother's dress." The child R. in the twenty-fourth month ran to his mother and hid his face in the folds of her dress when I appeared one day wearing a strange hat. Other observers report that children sometimes

show fear at too marked changes in their own apparel, but I have never noticed it in my two children.

FEAR OF ANIMALS

“How happens it,” asked Preyer, “that many children are afraid of dogs, pigs and cats, before they know the dangerous qualities of those animals?” Fear of perfectly friendly and harmless animals, cats, dogs, horses, pigs, appears at some time or other in nearly all children. The origin of these fears has been variously explained. Preyer, Darwin, Hall, James, and others believe them to be instinctive. Hall, for example, says of animal fears, “More than any others, these fears seem like lapsed reflexes, fragments and relics of psychic states and acts which are now rarely seen in all their former vigor.”¹ James cites a case which tells strongly for the instinctive fear theory.

“One of my children,” he writes, “from her birth upward saw daily the pet pug-dog of the house, and never betrayed the slightest fear until she was (if I recollect rightly) about eight months old. Then the instinct suddenly seemed to develop, and with such intensity that familiarity had no mitigating effect. She screamed whenever the dog entered the room, and for many months remained afraid to touch him.”²

¹ *Amer. Jour. of Psychol.*, Vol. VIII, p. 210.

² *Principles of Psychology*, Vol. II, p. 417f. Is it not entirely possible that Professor James’ child received the fear suggestion from some member of the household, or that she suddenly *saw* the pug in a different way, some act on his part, wriggling, frisking, his teeth — any one of a number

Others believe that most, perhaps all, animal fears arise in the first instance either because of the strangeness of the animals, or because the fear is suggested by the speech or actions of the child's companions. In the first case, animals are looked upon as intruders, they disturb the order of things to which the child is habituated, or if the animal jumps about, frisks, or utters cries of any sort it becomes still more fearful. My own observations lead me to think that instinct, or heredity, plays a very small part in causing children to fear *particular* animals, and that animal fears are due chiefly to strangeness or to suggestion, from some source, of possible harm.

Fear of cats.—Many stories are told to show how fear and curiosity, or interest, tend to combine in the attitudes of animals and little children toward various objects. Darwin gives an excellent example showing how the contrary impulses of curiosity and timidity affect their possessors. Having read Brehm's account of his experiments showing that monkeys have an instinctive fear of snakes, Darwin, who was much surprised by Brehm's account, repeated the experiments, making a number of variations, one of which was as follows: "I then placed a live snake in a paper bag, with the mouth loosely closed, in one of the larger compartments (of the

of new things may have been the disturbing factor. This, to me, seems simpler and more plausible than to refer it to a suddenly awakening instinctive fear of dogs.

monkey house). One of the monkeys immediately approached, cautiously opened the bag a little, peeped in, and instantly dashed away. Then I witnessed what Brehm has described, for monkey after monkey, with head raised high and turned on one side, could not resist taking momentary peeps into the upright bag, at the dreadful object lying quiet at the bottom."¹

The child R. on a number of occasions showed a mixture of fear and curiosity very like that of the monkeys' described by Darwin. Once (in his sixteenth month) an unusually good-natured and well-behaved cat came into the room where R. was playing. At first, the child ran away, making a fretful cry. But he was eager to be where he could see the cat, peering from behind chairs and tables, and finally, after much coaxing, cautiously touched the cat's ears and nose with the tip of his finger. But at the end of three days, during which he frequently saw the cat, the child still was afraid to have the cat come near him, and would fret and toddle away every time it did so. But if he could look at the animal at a safe distance nothing in his new environment was half so interesting.

So far as I know the child did not see another cat for more than four months. One day (last week of the twentieth month) the child sighted a kitten two-thirds

¹ *Descent of Man*, Vol. I, p. 42 (Appleton Edition, 1871).

grown while we were out for a walk. At first he was greatly interested in the animal, and kept saying, "tat, tat," and was content to look at the kitten so long as we kept at the safe distance of about fifteen feet; but when I started to lead him nearer he began to tremble and cry, partially squatting and crying, "tat, tat," anxiously and fearfully. When the kitten, which evidently was a house pet, made a step toward us he burst out crying and tried to hide his face between my legs. The fear was most acute, almost terror—and I picked him up and carried him in order to quiet him. When I let him down, he kept looking back anxiously and saying, "tat," as we walked along for a distance of three hundred feet. Two days later the interesting note was made that while the child was much afraid of real cats, he had not the slightest fear of the *pictures* of cats, or even of a large picture of a lion's head which he called, "tat." On another occasion, second week of twenty-first month, he spied a cat at a distance of about five rods coming toward him. He began to cry "tat," and toddled away as fast as he could. It was noted that a cat walking at a distance of five rods caused more anxiety than one at rest only a few feet away.

On the fifteenth day of the twenty-third month he would cry and tremble when a certain black pussy which had taken up her abode with the family, went near him. Nine days later, I was much surprised to find him stand-

ing beside the once dreaded creature as she lay on a chair, patting her and looking in her eyes and saying, "tee-tee" (kittie), in a tone that showed that fear had entirely disappeared. He had grown used to the cat being about the house, and playing with her easily followed. On the same day he enjoyed holding in his hands a two weeks' old kitten. From this time on the child would follow the cat about the house, addressing her much as he would a person, looking into her face and directing and coaxing her to go here and there, to get up on the chair or down from a desk or to follow him to another room. This was the last of downright fear of cats, although strange cats were nearly always viewed at first with suspicion and half alarm.

Fear of dogs.—The child R.'s first close view of a dog was in the last week of the first year. A black cocker-spaniel came frisking into the room and close to the person who was holding the child in her lap. The child looked very sober and shrank from the dog as he came near. (Should this be called instinctive fear of dogs, as such, or merely fear of a strange and demonstrative object? The latter, it seems to me.) About the middle of the fifteenth month he showed fear of an unusually playful two months' old fox-terrier. So long as the pup kept away from him he was pleased at the sight of him, but when the pup came too near, and particularly when he gave the child's face a friendly lick the child shrank away

and whimpered despite our best efforts to assure him of the pup's friendliness.

The child's actions (nineteenth and twentieth months) toward strange but friendly dogs furnished a number of good illustrations of the working of contrary impulses. He would follow the animals about the lawn or house with the greatest interest and cries of delight, but would cry and tremble if they turned and came near him. Sometimes, when we patted the dog and tried to get the child to do the same, he would venture so far as to touch the dog with the tip of the finger; but more often he shook his head fretfully and shrank away at the suggestion. (It was noted that while real dogs were feared pictures of dogs were liked invariably.) Frequent seeing did not seem to quiet his fear of a particular dog. All through his twenty-fourth month he saw a certain Irish setter every day, and was always pleased to watch the dog from a distance, but always cried and trembled when the dog came near him. The record for the third year shows that at the end of the year the child liked to watch dogs but invariably trembled and cried when they came near him, running away saying "hut hut wow-wow," *i. e.*, the wow-wow will hurt. . . . A little child's fear of dogs is due in part, I have no doubt, to the fact that dogs look very big to the child. Animals which look very small to us often look like mammoths to the baby and that fact alone is enough to cause apprehension.

Fear of insects.—That size is not the only factor in making animals feared or disliked is shown by the fear that many persons have of small and harmless insects. There is something about these humbler members of the animal kingdom which seems uncanny to many persons, young and old. Teachers of biology in high schools find that many pupils, particularly girls, have what they extravagantly describe as a “horror” of touching or handling insect specimens provided for class-study. Not only is fear or dislike of insects of all kinds very widespread, but many persons have a special dislike or dread of particular kinds of insects, such as caterpillars, angle worms, or sometimes even of butterflies. We are not surprised, therefore, to find dislike or fear of insects appear in little children.

R.’s first sight of a worm (middle of the nineteenth month) caused fear. The child was sitting on the lawn playing when a little worm not over an inch long caught his eye. He at once began to tremble and cry. Five days later he was playing with a ball which rolled away from him and near one of the dreaded “ums” as he called them. He wanted the ball very much but would not pick it up so long as the worm was near it. . . . By a curious association he developed a fear of house-flies (“ums” as he called these also) in the early part of the twentieth month. Fear of flies was even greater than the fear of worms. For more than a week his afternoon naps were spoiled by his lying awake and watching in dread of flies lighting on the net which was spread over his crib. In the first week of the twenty-third month fear of flies had disap-

peared ; but he was still afraid of worms of all kinds and sizes. I do not know how long his fear of worms would have continued, for with the approach of cold weather the worms disappeared. The next opportunity to observe the child's attitude toward worms was in the following summer, in the child's thirty-first month. At first he was afraid to touch a small measuring worm which had crawled on his dress, and wanted me to brush the insect away. By assuring words, and by letting the insect crawl on my own hand, I succeeded in entirely overcoming his fear, so that he not only no longer feared worms, but wanted them in his hands, calling them "nice, good, fine wums," words which I had used to get him reconciled to having them near him. This was the last of the fear of worms in the period covered by my notes.

Fear of horses.—Fear of the family driving horse which he saw and rode behind almost every day was first noted in the nineteenth month. The child would cry and struggle to get away if set on the horse's back or if taken near him, and he refused to touch the horse although we often tried to get him to do so. Finally, in the twenty-first month the child got up enough courage to rub and pat the horse—but timidly and cautiously. Two months later he was willing to sit on the horse's back and enjoyed patting him ; but curiously he was still afraid to go near the horse's head. Observation of the child's fear of horses was interrupted in the twenty-third month, and was not taken up again until the thirty-first month when fear to be near the animal—even his head—had entirely disappeared ; in fact, one of the child's

greatest pleasures was to allow the horse to eat grass from his hand.

Fear of wild animals. — Early in the last week of the child's third year I took him to see the animals belonging to a menagerie which had its winter quarters near our home. I first took him to the barn containing the mild mannered and relatively harmless, hooved animals, the elk, camels and the like; then to a barn containing an ibex, a hippopotamus, a sacred ox, an emu, a pair of small deer, a wild hog and some monkeys; then to the bear house; then to the barn containing the animals belonging to the cat family, lions, tigers, leopards and so forth, and lastly to the elephant barn. I thought by thus starting with what would seem to be the less fearful collection of animals and gradually approaching the most frightful, the child would get pleasure out of the whole visit. But in this I was mistaken. The first strange animals we came across caused just as much alarm as the more terrible tigers and lions; indeed as much as any animals we saw except the elephants. In fact, he showed fear of every strange animal we saw, showing his fear by his unwillingness to go near the animals and crying if urged too much to do so. His greatest fright, however, came in the elephant barn. In order to see the elephants we had to enter a narrow space, perhaps fifteen feet across, around which the great beasts, more than twenty of them were standing, munching hay, swinging their trunks and

uttering groans perhaps of discontent. The whole situation was enough to be disconcerting to any one not accustomed to it, and the child began to tremble and cry almost as soon as we stepped into the open space around which the animals were standing. The situation was overwhelming, and no wonder. The elephants must have looked like mountains to him, and with swaying bodies, trunks uplifted and swinging to and fro, and with the groans I should have thought the child precociously foolhardy or hopelessly sluggish and pachydermatous if he had not shown some apprehension in the presence of such an overpowering mass of matter and motion. As I stood there, I thought what havoc they would make if they should go on a "rampage"!

FEAR OF STRANGERS

Fear of strangers is a well-known phenomenon of infancy, and practically all babies, at some time or other, look upon strangers with distrust, particularly if the newcomer is over-attentive to the baby, tries to take him on his lap, for example. Following the theory already stated, fear of strangers is only one instance of fear of *strangeness* in general. The child accustomed to seeing a given set of faces, is disturbed by the first appearance of new ones. At first, this fear appears as a stare, a grave look; later, shrinking away and crying appear when strangers are too friendly with the child,

and still later, after the child is able to walk, he will scuttle away just as he does when cats and dogs come too near him.

The age at which fear of strangers first appears differs greatly from child to child. Miss Shinn says that about the middle of the fourth month her niece was frightened by a caller "dressed in black with a large hat." Considerably earlier (second week of the third month) R. showed fear of a lady caller dressed in black. The child did not cry out or shrink or try to hide, but the stare, the grave look was very noticeable when she tried to play with him or tried to take him to her lap. From this observation it would seem that Preyer and Sully are in error in the statement that babies do not manifest fear of strangers during the first three months, that prior to the fourth month all human faces look alike to them. By the middle of R.'s eighth month, fear of strangers was very pronounced; the grave look, the grimace and finally the cry came, in case the stranger gave him too much attention. But even then he did not fear all strange persons, and, as a rule, his fear vanished after a half hour or so, if the stranger tarried so long. In the latter part of the fifteenth month, the child R. had a big cry when the doctor who had had much experience with babies wanted to take him in his lap. A few days later he gave us much merriment by scuttling out of the room as fast

as he could when one of my colleagues stopped for a few minutes' chat. The child did not, on this occasion, seem so much frightened as shy. His face was placid and the request on the part of the caller to come to him was met with a positive but happy shake of the head in declination. . . . In the eighteenth month, the child was willing to go to almost any one, except heavily bearded persons and persons who approached him too abruptly. By the end of the twentieth month fear of strangers had disappeared; he no longer cried or tried to get away from them. But like adults, he was more at ease, his play and general conduct were freer, in the presence of persons well known than in the presence of strangers. Shyness, which as Sully remarks, is to be distinguished from, yet closely related to, true fear of strangers did not appear often in the period covered by these notes, *i. e.*, during the first three years.¹

¹ The following passage from Preyer's record of his child's "Interpretation of what is seen," may be quoted as an instance of fear of *a stranger dressed in black who unexpectedly appeared on the scene*:—"Eighteenth month.—At the unexpected sight of a tall man dressed in black, the child becomes suddenly still, stares at the man about a minute, flees to his father and gazes, motionless, at the tall figure. Immediately after the man had withdrawn, the child said *atta*, and was unrestrainedly merry and loud as before. Here an unexpected visual impression had evidently caused anxiety, without any assignable reason, for the man whose appearance the child did not know how to interpret was friendly toward him. It was not till the end of his second year that the child ceased to be so easily embarrassed by strangers in black dress" (*Op. cit.*, Part I, p. 64).

FEAR OF STORMS

In Dr. Stanley Hall's *Study of Fears*¹ in which he analyzed 5,037 separate cases of fear which were reported to him, he found that thunder-storms were named oftener than any other single object of fear. "Perhaps," he writes, "nowhere is the power of noise to control feelings, and also to excite imagery so well seen" (as in the effect of thunder). The sudden, vivid flashes of lightning, the peals of thunder, the dashing rain, the bending and creaking of trees and buildings seldom fail to awaken some uneasiness and alarm even in the stoutest heart. So we are not surprised to learn that sooner or later most children develop a fear of storms, particularly if severe and accompanied by heavy thunder.

Children differ greatly as to the age at which the storm fear first appears. R. first showed alarm at a rain-storm in the early part of the eighteenth month, looking very grave while the storm raged, saying, "wain wain" as the rain beat against the windows. Another child, J., twenty months old, showed not the least bit of alarm at a

¹ *Amer. Jour. Psy.*, Vol. VIII, p. 147ff. I cannot resist the temptation to quote a characteristic passage from Dr. Hall's reference to "wind" as a fear arousing agent, as follows: "It (the wind) is the band-master of the many membered orchestra of nature's music, and can play upon almost the whole gamut of our emotional life. The present reactions of childish and adolescent souls, or of special sensitized geniuses, or neurotics still bear some trace or scar of the more dreadful storms of the long age of diluvial man or even of the older sea which still make our souls better resonators to bring out some of the wind effects."

storm much severer than the one which caused R. much anxiety. In the nineteenth month, R. went about the room during a rain-storm shutting inside window shutters to shut out the rain. After closing all of them he said "ägä" (all gone) and went about his play.

As we should expect, storms at night are more likely to be fearful than day storms. Once in the twenty-fourth and once in the twenty-sixth month rain-storms which came in the night caused R. to cry and tremble with fear. In the last named month it was found that the child's storm-fear could be allayed, almost overcome by throwing pleasant associations about the dreadful phenomenon. The child's mother spoke of the storm as "funny," of the wind as playing in the trees and the like. So effective was this training that when, during a storm, of which there were a number during the child's twenty-seventh month, he was asked, What is that? as a loud clap of thunder died away, he said, "whun whun" (fun), and showed no alarm at the sound. This seems to agree with the common belief that many child fears can be overcome by patient and judicious training by parents; also that a great many fears are suggested to children, or, being very contagious, children easily catch them. At any rate R.'s fear of thunder- and rain-storms was almost entirely overcome by his mother's training. But fear of lightning soon appeared. In the latter part of the thirtieth month, it was noticed that the child

started and seemed frightened at sudden flashes of lightning. Most grown persons experience a slight momentary shock at the sight of lightning flashes, and children, perhaps because of their less stable nervous systems, are affected more strongly.

R.'s fear of thunder-storms ran another course in his thirty-second month, this time being strongly suggested by being caught in a rain-storm while driving with two of his elders who showed great anxiety at the approach of the storm, and who made a hard drive for shelter. On the basis of these notes one may say generally that the storm fear begins to make its appearance in the form of vague alarm or dislike about the middle of the second first year, and may be expected, under the most favorable educational influences, to reach its greatest natural height by the middle of the third year.

FEAR OF FALLING

In the latter part of R.'s nineteenth month he developed the very curious fear of narrow cracks in side-walks. When we came to them, while out for a walk, he would stop, utter a fretful cry and refuse to try to step across them, though in most cases they were not over an inch wide. I attributed this conduct to fear of falling for want of a better explanation, and for the reason that at this time he was afraid to step off elevations such as the street curbing even when they were only two or three inches

high. Again in the second week of the twentieth month while out walking we came to a place in the board walk where a board was missing leaving a crack five inches wide. The child stopped suddenly, saying "eh eh" anxiously as he looked down at the breach in the walk. Finally after much encouragement, he cautiously stepped between the boards on the earth, then onto the next board with a grunt of relief or accomplishment, I did not know which.

An unexpected form of the fear of crack-in-the-walk was seen in the child's refusal to try to step over a narrow crack in a bridge which we were crossing (twenty-fifth month). On this occasion, as on the former ones, it was impossible to say whether it was a case of fear of falling or merely fear of the strangeness of the break which the crack made in the fairly uniform appearance of the part of the bridge over which we had already passed. . . . By the middle of the twenty-seventh month fear of cracks in bridges or side-walks had disappeared, so also had fear of stepping down from low steps and curb-stones. . . . Two cases of fear which were more clearly fears of falling were seen in the last half of the third year. For a week during his thirty-first month the child took his afternoon naps on a couch one side of which was open. In some way he got the idea that he might roll off the couch and would not go to sleep until two chairs with closed backs were placed against the couch; then he felt perfectly

secure, became quiet, rolled over and went to sleep. On the first day of the child's thirty-second month while playing with the child I placed him astride the limb of a tree leaving his legs dangling in the air about four feet from the ground. (See Fig. 3, Plate 2.) At first, he trembled with fear saying "faw faw," but, being assured that I would hold him so he would not fall, the fear soon passed away and he was greatly pleased with the new position, wanted to dispense with my service, protested when I started to take him down, and asked to be put back on the limb after I had taken him down.¹

FEAR OF A NEWLY BORN BABY

R.'s first sight of his ten hour old baby brother caused marked signs of fear, or apprehension and bewilderment (twentieth month). He peered into the crib at the baby saying, "babie, babie," over and over in a half anxious, fretful tone and refused to touch him when urged to do so. He took the nurse's hand and wanted her to touch or take the baby, but he declined even to touch the

¹ The rapid change of feeling toward the new experience of sitting astride the limb of a tree, leaving the legs dangling free, was typical of the way emotional changes followed one another in many of the child's new experiences: first, aversion or fear, then toleration and contentment, and finally positive delight in the originally unpleasant situation—so plastic is the little child's nervous system, and so ready is he to find points of pleasure in new experiences the moment the original fear or aversion is quieted.

newly arrived ruler of the household. The baby's crying increased R.'s apprehension and anxiety about the meaning of the newcomer. Three days later he had a hard fit of crying when he saw the nurse place the baby to the breast. Fear of the baby gradually faded so that at the end of the baby's tenth day R. enjoyed looking at and touching him whenever allowed to do so.

FEAR OF FURS

Those who believe in the theory that fear of definite objects is inherited would score a point if it could be shown that most children are frightened by the first touch or sight of furs, the presumption being that a wide-spread fear of a definite sensation like that of the touch of fur could best be explained by reference to the remote past when our ancestors lived in mortal dread of hairy monsters, and that some "faint reminiscent echo" of the struggles our primitive ancestors had with their hairy enemies is found in the fur-fear. We find, however, as Dr. Hall admits, that *love* of furs is far more common than the *fear* of them. But instead of being surprised at this result, and looking upon it as a matter to be explained by reference "to a time when association with animals was far closer than now, or perhaps when our remote ancestors were hairy," is it not enough to say that the touch of soft furs is pleasing just as certain tastes and smells are pleasant. Of course, it is clear that such

a statement does not carry any explanation of just *why* the organism is affected pleasantly by one set of sensations and unpleasantly by another, or why some sensations are pleasing to some organisms and displeasing to others; why, for example, carrion is nauseous to us and seemingly pleasant and palatable to some of the lower animals. And here no doubt we have a problem in phylogeny rather than in ontogeny. But the explanation of our general liking for soft and smooth touches and our dislike of hard, rough ones requires a vastly wider sweep of racial experience than the reference to any single lot of touch experiences, *e. g.*, contact with hairy animals. At all events, the two children with whom I have experimented to learn their feelings about the touch of fur clearly did not experience any of "the frightful reminiscent echo" of ancestral combat with hairy monsters. On the contrary, both have always shown a keen pleasure in the touch of soft furs. My experiments with R. began on his seventy-third day (eleventh week) and were repeated at different times during the first and second years, with the result already mentioned. My experiments with J. began in the second week of his fourth month and extended through the eighteenth with results not very different from those seen when R. was given furs and encouraged to touch them.

MISCELLANEOUS FEARS

Under this heading will be reported fears which are

not easily classed under the headings already used. On his twenty-first day, R. was frightened when he was first put into a bowl of water for his bath. He shrank from the water as it was poured over him, and while he did not make an outcry, his whole expression was that of alarm at the new treatment, or rather the new method of treatment which he was receiving. But after a few days he became used to the bowl bath and sat in the water quite at ease during the bath. When, however, he outgrew the bowl and was put into a child's bath-tub for his bath, he experienced a new fright, holding firmly to the sides of the tub and trembling, showing plainly that the new surroundings were disliked and alarming. But he soon became accustomed to the change, and after a little while enjoyed being in the bath-tub filled with water.

A small number of single instances of fear remain to be mentioned: (1) Fear of a big, brown, soft hat which he refused to have put on his head although he liked to wear a black Derby which he saw frequently (eleventh month); (2) fear of the mewing of a cow (twenty-ninth month); scuttled to the house when the cow began to call to her calf although he had been interested in watching her so long as she was quiet; (3) fear of toads which he saw in the dim moonlight as they hopped along on the sidewalk or in the grass. This fear was quickly dispelled by referring to the toads as birds which he was used to seeing

hopping about the lawn in the daytime. A number of other fears were noted, but they belonged to the class of suggested or taught fears such as the fear of pins, stoves, knives and the like which the child had been told not to touch.

ANGER

Impatience, displeasure, disappointment, annoyance, vexation, shade so gradually into genuine anger that one cannot draw a line and say, this is clearly anger and that is something less than anger. We shall, therefore, use the word "anger" to include all those unpleasant feelings which if intensified and accompanied by a consciousness of their cause would constitute genuine angers. We shall not attempt to answer the question — at how early an age a baby feels anger — or what is the nature of the consciousness accompanying the earliest angry expressions; or whether, in the first weeks and months, angry cries are merely automatic affairs representing instinctive coördinations having no conscious value, as King and others believe. The answers to these questions, owing to the obscurity of the phenomena in question, must always be doubtful; and, in any event, the answers would differ from child to child. We can say, however, with a high degree of certainty that the anger expressing apparatus is almost ready to function at birth, that the baby comes into the world prepared to act *as if angry* in the

event the proper influences of his environment reach him.

The causes or conditions of anger, or impatient crying on the part of the infant may be divided into four classes: (1) when the gratification of an instinct, like sucking, is thwarted, (2) when a pleasant sense-experience is interrupted, (3) when the child's purposes are crossed, (4) when an injury is associated in the child's mind with the idea of its cause. We have seen already in the paragraphs on "Unpleasant Feelings" (p. 80) that the child R. uttered fretful, impatient cries in the first days when the instinct to suck was thwarted either by his failing to get the breast, or by losing it after it had once been seized; also that on his fifth day the child cried out if a finger or other object which he had been allowed to clasp was pulled as if to take it away from him. The fretful crying as if annoyed (seventeenth day) when the child's hands were handled or held was also mentioned. These early cries, no doubt, belong to the instinctive group and possess only slight conscious value. But they were clearly different from the cries of hunger, of bodily discomfort from washing, of displeasure when the lips were touched with cold water, or the cry following a startling noise like the slamming of a door, or a shrill whistle. We saw also that early in the fourth month, crying ensued if an object — as a tassel — which he had been holding was taken away from him. A little later in the

month, failure to get his hands on an attractive object—a watch or toy—brought forth impatient, fretful cries. (Mrs. Moore reports that in the sixteenth week her child reached for balls with the open hands and seemed annoyed when he could not reach them.) Still later in the month, R. was distinctly displeased when a wad of paper which he was crumpling and shaking was taken from him or when it rolled out of his reach. Early in the fifth month, signs of anger or impatience like those already mentioned, but more pronounced, were noticed when toys were taken from him, or when they were held over him, but out of his reach. In the latter case he would reach for the toy, and if unsuccessful would break out crying. Three new causes of angry crying were noted in the sixth, seventh and eighth months; (1) efforts to get the child to go to sleep were frequently resisted by kicking and angry crying (sixth month); (2) laying the child in his crib after holding him for a time in one's lap often brought out angry cries (seventh month); (3) unmistakable signs of anger (reddening of the scalp, thrusting bottle from mouth and crying) appeared if the child was given a bottle containing water instead of milk, near his regular feeding time (eighth month.) Early in the ninth month considerable variety was noticeable in the manner of expressing anger and its near neighbors disappointment, annoyance and so forth. For example, the child's outcry when resisting an attempt to take a toy from him

was very different from the angry cries one heard when his nursing bottle did not allow the milk to flow freely. In the tenth month attempts to put the child to sleep were resisted by angry cries, stiffening the back, and a general tension of the muscles. In the same month, fretful crying followed when toys, dolls, balls, etc., were taken from him, or when playthings rolled out of his reach. Striking up and down with the arms appeared in the twelfth month as a clearly marked feature of the angry expression. Also throwing things away which were offered to him as substitutes in order to get him to give up dangerous articles (a table-fork, for example), or in order to divert his mind when he was angry, or when he desired to be taken up. Unsuccessful efforts of all kinds, *e. g.*, to move an article of furniture at which he was tugging, nearly always brought forth fretful, impatient cries. In J.'s thirteenth month, in connection with a series of observations and experiments to determine the child's method of learning to put a pencil in a spool-hole, appeared a very curious and a very adult-like expression of impatience when the child failed to get the pencil in the spool-hole. He would sit working patiently trying to get the pencil in the hole for a few seconds, like an older person trying to get a coarse thread in a little needle eye, then, if unsuccessful, would give his hand a little impatient toss or shake as if to say, "O pshaw," then begin to kick rapidly with both feet. It was a beautiful illus-

tration of the tendency of energy to flow out along smooth channels when the course into which it had been directed was found to be blocked.¹

A comparatively mild but clearly marked form of expressing anger was developed in the latter part of R.'s fourteenth month when the child was refused articles for which he was reaching. First came a frown, then head and shoulders were thrown back, the back stiffened, and a grunting protest was uttered. Eagerness for given objects and impatience because he could not have them was expressed by a fretful cry and jumping up and down from the hips when sitting. This expression was the fore-runner of the fretful crying and "dancing" in eagerness and impatience which appeared in the early months of the second year.

Probably the foregoing will be sufficient to indicate the general causes and the forms of expression of the emotion of anger and closely related feelings in infancy. During the remainder of R.'s second and third years, neither the situations which provoked anger, nor the forms of its expression differed greatly from those al-

¹ One could not watch this performance without thinking, "how like the conduct of the grown-up in the presence of obstacles which block his line of advance," with the striking difference, of course, that the adult usually has better control, and inhibits the impatient toss or shake of the hand, and the kick. Moreover, he takes thought about the difficulties of the situation, and devises ways to overcome them. And yet, in the nursery, one sees human nature stripped of all artificial disguises, forms, pretense and false shows.

ready mentioned. About the middle of his third year, stamping with one foot to enforce his requests or petulant commands became, for a time, a striking feature of his manner of showing bad humor. For example, after he had with great pains piled twelve cubical blocks on top of one another his little girl playmate K. struck the pile and knocked it over. The first time she did this, R. only looked slightly puzzled and rebuilt the pile. The second time she knocked them over, he shouted over and over, "No, K.," shook his hand at her and stamped his foot to emphasize his protest against her naughtiness. A day or so later, the child was seen stamping his foot at his infant brother when the latter refused to let loose of a little wagon which R. wanted.¹ (I am not sure whether the stamping was imitative or original with the child, but I think the former.) In concluding this brief account of anger it may be said that I have never seen in R. the violent outbursts of anger which some observers report, such as striking blindly and viciously, kicking at offending persons and things, biting, and hurl-

¹ With reference to stamping as an expression of anger, Stanley Hall makes the interesting observation that, "In many savage dances, stamping the ground sometimes with bare feet and with great force is an expression of annihilating an imaginary foe. Sheep, some birds and other animals do the same. Stamping suggests having the enemy under foot and thus complete triumph. A vigorous up and down movement can tread life out very effectively. Our returns show that soon after learning to walk, children vent anger thus first with no reference to an adversary" (*Amer. Jour. of Psy.*, Vol. X, p. 555f.).

ing missiles, or any of the more violent forms of expressing anger. I have never seen a single trait which even the "unembarrassed scientist" would call vicious. Whether these decidedly ugly traits do not appear in the first three years, or whether the child is unusually mild tempered, or whether because some pains have been taken not to provoke him unduly, I cannot say positively. My belief is that it is not in the disposition of the child to feel high rage, his temper is equable, and he has not had an opportunity, so far, to learn from other children by imitation the more violent forms of expressing anger.

CHAPTER V

DEVELOPMENT OF IMITATION¹

A CHILD'S imitative movements are called forth directly by similar movements on the part of some other person or thing. In imitation the exciting stimulus is copied with more or less exactness, and the presumption is that the action would not have occurred but for the existence of the copy.

The psychologist explains the rise of imitative movements by referring, first, to the general law that "every sort of consciousness whatever, be it sensation, feeling, or idea . . . directly and of itself tend (s) to discharge into some motor effect;"² and then, to the special statement of the law that "the idea of a movement is already the beginning of that movement," understanding "by the 'idea of a movement,' not merely the clear consciousness of a movement, but also the vaguest and most subconscious reminiscences, feelings, in-

¹ The description of the development of the imitative function given in this chapter is based, in the main, upon the record of the child R.'s imitative movements. While the account gives, so it is believed, the general order of the development of this function one should make allowance for individual differences among children when comparing this report with others. . . . No reference is made in this chapter to the development of imitative speech, or of the early forms of imitative pencilings. These topics are discussed in the chapters on Language and Drawing respectively.

² James, *Talks on Psychology*, p. 170.



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PLATE III.—1 AND 2. IMITATIVE MOVEMENTS. 3. IMITATIVE WAVE OF THE HAND. 4. THE "SLEEPY RUB." 5. AN EARLY STAGE IN LEARNING TO USE A SPOON.

timations of movement which cluster, or hang about or enter into, however meagerly, the state of mind which issues in the movement making up the suggested reaction."¹ For example, the idea of nodding the head is the beginning of that movement, and if the idea is vivid enough, and if not inhibited in some way, the movement will occur. It is said further, that the child is more imitative than the older person for the reason that his ideas meet fewer inhibiting factors ; so an idea in the child's mind tends to issue at once in action.

Reflex imitation.—The infant's earliest imitative acts are of the reflex type, and include crowing, gurgling, murmuring and other not easily described happy responses to the lively manner and prattle of those caring for the child ; and also sympathetic crying. These first imitative reactions are of the nature of sympathetic responses of the organism to the environment ; they belong to the class of movements which Stout describes as "sensation reflexes."² It is as if the child brings into the world an organism partially tuned to respond in like to certain stimuli of his environment.³ So when one leans over a baby's crib and laughs or prattles in a lively manner, the baby, if in comfort, makes gurgling and crowing sounds

¹ Baldwin, *Mental Development*, p. 167.

² Cf. Stout, *Manual of Psychology*, Bk. II, Chap. II.

³ This native characteristic of the organism accounts, in part, for what is known as the "contagion of emotion," for the catching nature of moods either of cheerfulness or gloominess among older persons as well as among children. Mothers and nurses often observe that if one baby in a nursery breaks out crying, others will begin crying in sympathy.

in response. The child seems to catch the mood of his entertainer. Somewhat later appear murmuring, scolding, crowing; and later still, mouth twisting, which has every appearance of being an effort to "talk" or to make vocal sounds, in response to the prattle of the child's entertainer.

Miss Shinn states that "in the fourth month her niece made her little sounds with an air of friendly response when we prattled to her, giving back murmurs, croaks, and gurgles for words. . . . If we imitated to her some of these sounds she seemed to imitate them back."¹ Mrs. Moore observed that, "by the thirty-sixth day her child, when talked or sung to, began to move his lips and to make some sounds, and that ten days later responsive sounds were habitually made." As Miss Shinn suggests, it would be unsafe to conclude that these responses, so imitative in appearance, are intentional. The child does not *mean* to imitate the prattle or singing. Nor are they mere "accidental coincidences," as Preyer thinks. The prattle and singing call forth imitative responses — smiling, gurgles, murmurs, and crowing — as certainly and as uniformly as laying a pencil in the child's hand calls forth the clasping reflex.

Of course one cannot be absolutely sure that these responses, apparently so imitative, are in every case called forth by the

¹ *Biography of a Baby*, p. 137f.

laughing prattle and the lively manner of the one entertaining the baby ; that they are not spontaneous in some instances, and that the resemblance to the copy is not a mere coincidence seized upon by the observer. One also remembers that when one is bent on getting the baby to do something, he cannot help giving some sort of exhibition. Neither the tone of voice nor the manner of the demonstrative object before him suggests crying — an easy thing to do — so his response flows out in another hardly less smooth channel, namely, gurgling, crowing, murmuring.

The instance noted by Preyer of his boy pursing the lips imitatively in the fifteenth week, probably, was an “accidental coincidence.” In that instance, the father set as a copy a movement — pursing the lips — which the child had performed many times spontaneously, and so was an easy line of expression. When the father pursed his lips for the child it was to be expected that the child would do something, and that the motor discharge should follow a path already smooth. The pursing-lips path was such an one, and, in the case noted, was the one which was taken. This interpretation (which Preyer himself suggests as the most likely one) is strengthened by the fact that imitative pursings could not be called forth again before the seventh month, notwithstanding much pains on the father’s part to induce them.¹

Conscious imitation. — Gradually, the reflex or organic gurgling, murmuring and crowing which characterize the first four months disappear. The extravagant mouth formations which were made formerly, when one talked

¹ Preyer, *Op. cit.*, Part I, p. 283. For further discussion, see Baldwin, *Mental Development*, Vol. I, p. 131ff.; also King, *The Psychology of Child Development*, pp. 46, 59.

and played with the child, are seen no longer, and he is beginning to make movements which are more like what we mean ordinarily by imitative actions. That is, they are called forth by perceptions of another person's actions, something the child either sees or hears. He has reached the stage of what is often described as "conscious imitation" in which the stimulus to action is a mental image.

In their earliest forms, the child's mental copies are only imperfect reproductions of the original copies; are vague, indefinite, largely sensory in character, but having the quality of vividness and the power to excite a motor output. Examples of mimetic responses to these early, crude, sensory images are:—the child J.'s protruding his tongue (234th day) as he watched the copy which was made for him; also the child R.'s imitating shaking a newspaper to make it rattle (237th day). It was curious to observe that while R. would shake the newspaper to make it rattle after another person had shaken it, all efforts to get the child to clap his hands together failed, as did all attempts to get him to wave the hand as when one salutes by a "bye-bye" wave of the hand, though the movements were made for him slowly a number of times.¹

¹ The wave of the hand in making the "bye-bye" salutation is a baby accomplishment always looked forward to with interest by the baby's friends. R. had a girl friend who was anxious to hasten the learning of this

A better illustration of conscious imitation is found in a note made near the end of R.'s eighth month which reports, "that the child tried to put a newspaper over his head after being entertained by his mother holding a newspaper over her head, sunbonnet fashion, and playing peek-a-boo with him." Another observation recorded in the latter part of R.'s ninth month was that the child imitated the difficult performance of picking up a small tin box, throwing it down, picking it up, throwing it, and so on. In order to quiet the child, I was picking up and throwing the box in a clownish manner on the bed beside him. For some reason, the performance caught his attention, and after I had thrown the box a few times, he picked it up and half tossed, half dropped it. The play gave him great pleasure, and it was kept up until we each had thrown the box by turns eighteen times.

At first, it seemed strange that the child should try to imitate these and other complicated movements, but would not attempt such simple things as shaking or waving the hand, clapping the hands together, or nodding

particular movement, and who made frequent attempts to call it forth during the child's tenth and eleventh months. Once, in the tenth month, I thought I saw a feeble shake of the hand in response. But it could not be called out again, so I was not sure; and it was not until the twelfth month — first week — that the response to our salutes first appeared unmistakably. Gradually, it grew definite and prompt, and by the beginning of the second year the hand wave in answer to "bye-bye" salutes was under good control. (See Fig. 3, Plate 3 for snap-shot of the child J.'s first imitative "bye-bye" wave of the hand — twelfth month.)

the head. It did not seem to occur to the child that our numerous hand and arm wavings and shakings, and head noddings were intended as copies for him to imitate. He would look at us with an expression of curiosity, but made not the slightest effort to repeat what we did.

This suggests that it is not always the simple and easy things — as they seem to us — that are tried, but rather those that strike the child's interest, perhaps, because of their novelty. Playing peek-a-boo with a newspaper over one's head, or throwing a box, or shaking paper to make it rattle is clearly more novel, more interesting to the child than waving the hand in salutation, a performance rich in meaning to an older person, but meaning nothing to the child.

Preyer makes the general observation that, "the movements made for imitation are the more easily imitated correctly the less complicated they are." For example, his boy imitated the simple movement of opening and shutting the hand better than the complicated one of blowing out a candle.¹ But this is not the same as saying the simple movements are the ones the child *selects* for imitation. It seems, on the contrary, that complicated actions — within certain limitations, to be sure — are the more likely to arouse the imitative impulse than simple ones. They are likely to be more interesting, more striking, to have more spectacular qualities, which enhance the imitative value of an action. At any rate, the simple and easy things which the child sees make no stronger appeal to his imitative impulse than the complicated and difficult ones.

¹ *Op. cit.*, Part I, p. 288f.

In explanation of the better imitation of the opening and closing the hand, Professor Preyer thinks we must take account of the element of heredity, and offers the doubtful theory of the transmission of acquired characters. According to this theory, which, apparently, Preyer accepts, each of the countless generations of the child's ancestors had opened and shut the hands numberless times, thus acquiring great ease and skill in making that movement; and the ease and skill thus acquired have been transmitted from generation to generation. If blowing out candles had been an ancestral activity as long as opening and shutting the hand, it too—according to the Lamarckians' account—would have been performed successfully and gracefully after Preyer's child had tried it a few times.

Imitation of other persons' bodily movements.—A notable advance in the imitative function is in the appearance of rough imitations of others' bodily movements—like nodding the head, shaking the hand, holding the head on one side—which at an earlier period, as we have just seen, aroused nothing in the way of an imitative response. In the earlier months, it was not the hand or head movement as such which was imitated, but the thing done, *e. g.*, shaking the newspaper or toy to make a noise; or in the case of throwing the tin box, the interest centered in throwing-the-box; so that—not the motion of the hand—was imitated.

But after a time, say in the last quarter of the first year, the child begins to imitate movements of parts of the body, like shaking the hand or nodding the head. This probably marks an advance in the child's perception

of points of similarity between himself and other persons ; also in control over the separate parts of his own body, and imitative nodding and hand-shaking have to wait for an advance in those respects before they can occur.

Memory images as stimuli to imitative reactions.— Prior to the last quarter of the first year, imitation occurs only in the presence of an objective stimulus. The things imitated are immediately present movements. Toward the close of the first year, memory images begin to act as stimuli to imitative movements. The child recalls, after a brief interval, his former activities and repeats them. For example, the sight of a hair-brush revives the image of brushing his hair, and when given a brush he rubs his head with it as he had on the preceding day. The child J., in his twelfth month, remembered, after an interval of two days, that a marble was to be put in a tin can, and that the can was then to be shaken ; that a candle goes on a can ; that blocks were to be set on his head ; and that they were to be piled on top of one another.

Somewhat later, say in the fifteenth month, the child recalls and imitates movements which he has not seen for two or three weeks ; and, in some cases, movements to which he did not react imitatively when they were first witnessed. It was as if it required the intervening weeks for the effect of the stimulus to percolate through the nervous system and touch off the proper motor

centers; as if the result of the stimulus, which was not strong enough to excite action on its first occurrence, was absorbed and finally worked itself out in action.

Purposive imitation.—In the closing months of the first year, the element of purposiveness was noticed, for the first time, in R.'s imitative reactions. In former months, such responses as rubbing the head with a brush, or shaking the hand seemed more like rough shadow-pictures of what another was doing than expressions which belonged to the child. The imitative reactions were automatic, mechanical in appearance. The child was like a machine that was being played upon. Now, his mimetic responses seem more like purposive, voluntary acts of the child's. Occasionally, however, there appeared, even to the end of the third year, instances of what one may describe as unconscious, shadow-like imitations such as were dominant at an earlier period. They are like the reflex yawning of older persons; or like one's unconsciously keeping time with music by patting with the foot. One instance of this was noted in R.'s thirty-fifth month, as follows: The child stood watching me as I brushed dust from my shoulders. He at once began to make random strokes toward his own shoulder, but seemed wholly unconscious of what he was doing. This was an instance of "unconscious" as distinguished from "purposive" imitation.

Rapid growth of the imitative impulse.—Beginning with the first quarter of the second year the imitative impulse grows stronger rapidly until it seems that the child is above all things imitative. Imitation becomes the predominant feature of all the child's behavior. Thus, one note from R.'s record for the fifteenth month reads, "Imitation is supreme in all the child's activities. He seems to have an irresistible impulse to imitate everything he sees others doing, particularly if it concerns him in any way, as patting his cheeks, pulling his toes, combing his hair."¹

¹ At this point, may be described two experiments with J., the results of which illustrate an interesting stage in the development of the imitative function; namely, that in which the child imitates only those actions which touch him closely. When J. was in the last week of his first year, I made the experiment of first placing a hat on my head a number of times, then gave the hat to the child thinking that he would try to put the hat on *his* head. But instead he tried to put the hat on *my* head. After playing thus for a few minutes—long enough to make sure that he would not try to imitate the movement by trying to place the hat on his own head—I placed the hat on *his* head, then handed it to him. He at once put it on his head. (See Fig. 1, Plate III for snap-shot taken at the time.) A day or so afterward, the child's mother, while playing with him, placed a block on her own head, then handed the block to the child to see if he would try to put it on his own head. But he only laughed and gave the block a toss. Then she placed the block on the baby's head and left it. When it fell off, after resting on his head a few seconds, the child picked it up and tried to get it to rest on his head as it had when placed there by his mother. (See Fig. 2, Plate III for snap-shot of the child as he was trying to get the block to rest on his head.) Why the child failed to respond imitatively when other persons placed articles—the hat in one case, the block in the other—on their own heads, and yet responded so promptly when the articles were placed on the child's head, is an interesting prob-

Spontaneity and promptness of the imitative response.—Prior to the second quarter of R.'s second year the child's imitative responses were more or less elicited, the things which were imitated were forced upon the child's attention; it required some effort to get him to imitate. In the sixteenth month, the child's imitative actions became noticeably spontaneous. "There is no longer need," so one note for that month reads, "to coax and appeal and devise ways and means to get oneself imitated as was the case in the tenth and eleventh months, *e.g.*, when trying to get the child to imitate a wave of the hand or a nod of the head. Now, imitative actions bubble forth even when least expected." For example, on a certain day (sixteenth month) the child suddenly stopped his play, held up his hand as if holding a cigar and made puffing sounds as if smoking in imitation of one who at the time was smoking, as he talked to other members of the family, but was paying no attention to the child. Sully relates that when his boy was sixteen months old "he spontaneously imitated, in a rough fashion, the puffing sound produced by his father when indulging in the solace of tobacco."¹

In R.'s sixteenth month there was also an advance in the development of imitation, for which the writer has no solution except the broad one that the child, at that time, did not notice sufficiently the general similarity between himself and other persons to prompt trying to do what he saw them doing.

¹ *Studies of Childhood*, p. 417.

the *promptness* of the imitative response to the copies set for him. The imitative apparatus seemed always ready for immediate action; in fact, waiting for the occasion. Nor was it necessary to teach the child the action or to repeat the copy over and over before getting a response. The passage from impression to motor discharge was smooth, and action was immediate in most cases.

Dramatic imitation. — Early in the third year, one may observe that the child's imitative behavior becomes more dramatic in character, and that it shows a freer play of imagination than previously. To illustrate: On the second day of R.'s twenty-fifth month, I gave the child a rag-doll, made by tying a knot in one corner of a handkerchief, which he laid in a baby crib, and then began to beg for a nursing-bottle so he could give the doll its "bëttie" (breakfast). This imitative play was suggested, no doubt, by seeing his infant brother laid in the crib and given his nursing-bottle at the same time. The play with the rag-doll was repeated three days later with the variation that on the latter day he wanted a blanket to spread over the doll. A few days later, he called for toast which he fed to a rubber-doll by pushing it into the doll's imaginary mouth. On the twelfth day of the month, he brought me a handkerchief saying, "döih," meaning that he wanted a knot tied in the handkerchief. This I did. He then laid the doll on the

floor, and ran to his mother calling for a "bātie" (blanket) to spread over the doll. Another instance of solicitude for the doll's welfare appeared a few days later when he called for "mězie" (medicine) and a particular bottle from which he had frequently seen liquid poured and given to his infant brother.

Again, in the latter part of the thirty-second month, imitative play with a doll was noticed on two or three occasions. I transcribe the notes describing one instance: "R. lays the doll on the porch step, saying, 'go tseep'; then kisses the doll; then takes the doll's thumb and puts in its imaginary mouth, saying, 'hīz smum' (here's your thumb); then, 'goo-bye,' 'wate up,' 'tsum,' and puts doll's thumb in its mouth again; then, 'go tu tseep, dollie, goo-bye,' waving his hand; then, 'hī tīs smum, hi tis choo-choo,' as he laid his toy engine in the doll's arms. He then went away leaving the doll to take its imaginary nap."

Imitation of fine movements. — An examination of R.'s record for the months prior to the last quarter of the second year shows how large, open, and easily seen were the movements selected for imitation; and also that the reproduction usually was only a rough approximation to the copy. In the last months of the second year, a marked advance was noted in the child's ability to see and imitate relatively fine or small movements. For example, on a certain day near the middle of the twenty-

third month the child imitated putting a pencil to the lips to dampen it; and a few days afterward he punched and picked with a nail-file at his finger nails after watching a person using a nail-file. The attempts to copy the fine movements, which were selected for imitation, as a rule, were crude, excepting the dampening of the pencil, which was almost a perfect copy on the first trial. But rough as they were they gave evidence of a marked improvement in the coördination of eye and hand movements.

Imitation of complex actions.—In order to test R.'s ability (twenty-fifth month) to see and repeat a relatively complex act, I laid a ball in the bowl of a tablespoon, gave the ball a toss and struck it as it fell. Here was an act consisting of three pretty distinct parts. The question was, Would the child see all these parts and try to repeat them? He put the ball in the bowl of the spoon, gave it a little toss or shake, but did nothing which one could call an imitation of the third part of the performance, *i. e.*, striking at the ball as it fell. And it should be said—the whole performance was very imperfect, no part being done with skill or speed.

Seven months afterward, I made the same experiment. As soon as I tossed the ball, he said, "Wadu han," *i. e.*, R.'s hand—he wanted to toss the ball. He put the ball in the spoon, tossed the ball eight or ten feet high, but made no attempt to strike it as it fell. After watching

me tossing and striking the ball a few times, when I let him have the ball and spoon he did give the spoon a lateral motion after tossing the ball, but after it had gone out of his reach — even behind him and had fallen on the ground. That is, he did not watch the ball after tossing it and try to strike it as it fell; and there was no attempt to coördinate the direction of his eyes and the movement of his arm or hand.

The fact that, as the child gets older, his imitative movements approach more nearly his copies was shown in the improvement R. made in imitating razor stropping. Thus, in the twenty-sixth month, this imitative action was a feeble holding the strop and striking it with a pencil or stick at right angles. There was none of the back and forth motion one usually makes when stropping a razor. In the twenty-ninth month, the idea of rubbing the pencil on the strop was clearly present, though he rubbed the pencil in one direction only. In the last month of the third year, the idea was clearly present that the stick, or whatever he was using in imitating razor stropping, should be rubbed back and forth, though the motion was made awkwardly.

Improvement of the child's imitative acts goes along with increasing ability to see and hear, with improvement in muscular control, and with better coördination between muscles and sense organs. The clearer, more definite, and complete his ideas of his copies become, and the

better the coördination between his ideas and his hand movements, the better, the more accurate become, in general, the child's imitative actions. Still, it should be said that many of the imperfections of a child's early imitative movements, *e.g.*, when learning to catch a ball, are due, not so much to an imperfect image of how the thing will look when it is done, but to the vagueness of his idea of going about it, *e.g.*, how to hold his hands and how to seize the ball when it is tossed to him.¹

Imitative actions as means to desired ends.—Prior to R.'s third year, actions were imitated because they were interesting in themselves; *e.g.*, brushing the walk and driving nails after watching another person doing these things. His interest was in the act itself. Early in the third year, we noted, for the first time, imitative acts which were performed, not so much because the copies in themselves were interesting, but because they were useful as means to desired ends. The child sees a person doing a certain thing to gain a certain end: when he

¹ The child R.'s learning to blow a whistle imitatively furnished a good illustration of the application of an old accomplishment to a new use, as follows:—At first the child could not get any sound out of the whistle, but made a squealing sound as he held the whistle to his mouth. Then his mother said to him, "Blow as you do when you blow feathers," which he did. He then placed the whistle to his mouth, used the feather-blowing combination of muscles, and on the first trial produced a feeble whistling sound. He had hit upon the right method, was greatly pleased by the feat, and practiced until he could blow the whistle to the abundant satisfaction of his hearers.

wants to bring about the same result, he goes about it in the same way. For example, R. saw his mother use a hat-pin to get a piece of cardboard out of a box into which the child had pushed it and had gotten it fast. When, on the following day, he again got the card fast, he asked for, and was given the hat-pin to use in getting the card. As soon as he got the card, he laid the pin aside, and continued the play with the card showing, it seemed, that it was not merely the idea of using the pin in the new way which prompted him to call for it.

Imitation in order to improve one's ideas. — We have seen that sometimes an action is imitated because the action itself is interesting to the child; and that at other times, the child imitates an action as a means to a desired end. In the latter part of R.'s third year, were first noticed imitative acts which were performed mainly for the purpose of giving his ideas of things observed better definition, of enriching and perfecting his images. To illustrate from adult life: a grown person who is watching, for the first time, a person skating, or striking a golf ball, or "serving" in a game of tennis, says, "I want to know exactly what the act is, how it 'feels' to do the 'thing,'" and realizes that until he has "felt" the act, he doesn't really know what it is like. In like manner the child wishes to repeat actions he sees in order to learn better what they are, and how it feels to do them. A few instances selected from my notes will illustrate the point

On a certain day, in R's thirty-fifth month, when I was writing on a typewriter, the child stood by watching quietly for a few moments, then cried, "Wa (R.) do 'at now, play papa plāno" (piano). On another day, same month, after watching us weigh a certain article, he got the scales and busied himself for half an hour "weighing" dolls, "choo-choos," a toy horse, and other similar articles. On another occasion, after watching me writing with pen and using a blotter, he got a pencil and paper, scratched over the paper, then called for a blotter which he pressed on the scratches he had made. Another imitative act which probably belonged to his class was making motions as if pulling an imaginary mustache.

Impulse to imitate new actions. — Observers of infancy find that the novelty of a performance enhances its imitative value in the child's eyes. And this explains, in large part, the fact that children imitate male members of the household more than they do the female, except when the latter are engaged in doing things which are new to the child. The things which the child sees his father, *e. g.*, doing, and which are selected as copies, are relatively more novel to the child than the things which he sees others, *e. g.*, his mother, doing. The things his mother does have greater sameness from day to day. Her round of household duties discloses fewer new things to the child's curiosity. Lacking the quality of novelty they make little appeal to the child's imitative impulse. On

the other hand, the child has seen his father driving a nail, but not often. So when he does see that new action, he straightway tries to mimic its more easily observed features. So with using a saw, stropping a razor, sitting with the legs crossed, smoking, and other distinctively male accomplishments.

We have just said that little children tend to mimic the father more than other members of the family. My record of R.'s imitative behavior contains a curious exception to this general statement, as follows: In the latter part of his third year, R. developed an irresistible impulse to imitate his baby brother J. Thus, if the baby walked on his hands and feet, R. straightway imitated him; if J. stood against the wall to support himself, R. too would lean against the wall; or if J. worked his way around to a door-knob and tugged at it, R. would push J. aside and begin tugging at the knob himself. Often R. would follow J. about the house for an hour doing as nearly as possible everything J. did. If J. went to the box containing their toys, and began to take them out of the box, R. got down beside him and mimicked him even to the cries which J. made as he picked up one toy after another. So strong was his impulse to do what J. was doing that he would drop one of his own favorite toys to take something J. had, and try to do with it what he had seen J. doing. As he did this over and over again, one could not help thinking that the imitative impulse is at the

basis of much of the so-called greed and selfishness, and possibly envy, as they show themselves in little children. R. did not take toys away from J., because, primarily, he did not want J. to have them, but because he wanted to *do* with them what J. was doing. That is, a strong impulse to imitate was the basis of his mistreatment — entirely unintentional, to be sure — of J. Imitation in such cases shades gradually into greed, selfishness, envy, and related impulses.

Influence of outdoors living upon imitative conduct. — It is evident, on first thought, that the character of a child's imitative behavior is determined largely by his environment. The impulse to imitate is general, but the particular forms in which it shows itself are determined by the particular sensations and ideas which his environment furnishes. And with reference to the influence of indoor and outdoor life, it will be found that the child while living indoors, with his sphere of activity restricted relatively, and in closer relations with members of the family — and so having their actions more narrowly impressed upon his attention — will be found to be more imitative in general, and of other persons' actions in particular, than when the child leads a free, outdoor life — running among trees, playing in sand or dirt, throwing and running after balls, piling toys in wagons, running with them, and the like. The outdoor life means, of course, less dependence for entertainment upon the actions and

association of older persons, and the child imitates more. The child does not cease to be imitative when he passes to the outdoor life, but he becomes more independent. And one may say, in a broad way, that under the conditions of modern civilized life, in temperate zones, education which comes from imitating one's elders is administered most economically in winter, and that education through self-activity is realized most fully in the warmer seasons of the year.

CHAPTER VI

COLOR

Color discrimination.—When considering the subject of the earliest color discrimination, it is necessary to distinguish two questions which are often confused. One of these is physiological, and relates primarily to the development of the visual apparatus, the maturing of the peripheral organ, the nerves and the brain centers concerned; that is, asks when is the physical apparatus ready for the sensing of color differences? The other question is psychological; namely, when is the child first dimly conscious of difference, that "this" is not "that," when in the presence of two different colors? That is, it is conceivable that a child should react reflexly in a characteristic manner to a given color, before the visual stimulus arouses sensations of color. So when one is asked, Can a child of a given age discriminate colors? it is important to know whether the inquiry refers to the child's physiological reactions, or to his ability really to discriminate, which latter involves rudimentary memory and judgment.

Observers have differed widely in fixing the earliest date at which their subjects, individual children, could distinguish colors; that is, were conscious of color

differences. For example, Preyer is confident that his child at the age of twenty-one months recognized the quality of some colors, "for the delight in striking colors was manifest."¹ Mrs. Moore writes concerning her child's ability to experience qualities of visual sensations,

"On the thirty-first day a white surface, receiving no direct illumination, acted as a stimulus, also a blue surface. On the thirty-fourth day a blue and white object and the golden brown curtain arrested his attention. On the fifty-third day a plaid waist in which scarlet was the predominating color interested the child. In the sixteenth week he looked repeatedly at his pink dress. . . . He showed that he recognized in his second year, without having received any instructions, the following colors: pink (eighty-fourth week), yellow (eighty-ninth week), black (ninety-fourth week), blue (ninety-seventh week), red (ninety-eighth week), light brown and gray (ninety-ninth week)."² (The sense in which the word "recognized" is used, unfortunately, is not entirely clear.) Miss Shinn writes, "No trace of color sense has ever been detected within the first fortnight of life, no certain evidence of it even within the first year."³

¹ Preyer, *Op. cit.*, Part I, p. 7.

² *The Mental Development of a Child*, p. 53.

³ *Biography of a Baby*, p. 43.

Differences like those just noted on the part of competent persons who have depended largely on general observation as distinguished from observation under carefully controlled conditions call for the experimentalist. So the question of the earliest color discrimination has been the subject of a number of experimental studies, none of which, however, it seems to the writer, has been entirely successful. Baldwin in his *Mental Development*¹ describes and critically considers four stages in the development of methods of investigating color discrimination, his own method being the fourth. "The first experiments," he writes, "consisted in showing a child various colors and requesting him to name them." Baldwin's criticism of this method is:—"this experiment involves no less than four different questions, and the results give absolutely no clue to their analysis. It involves (1) the child's distinguishing different colors simultaneously displayed before it, *i. e.*, the complete development of the child's color sensation apparatus; (2) The child's ability to recognize or identify a color after having seen it once; (3) An association between the child's color-seeing and word-hearing and speaking memories, by which the name is brought up; (4) Equally ready facility in the pronunciation of the various color names which the child recognizes." The results obtained by this method, Baldwin properly

¹ Vol. I, p. 39ff.

regards as worthless so far as the problem of the earliest perceptions of color differences is concerned. It is only fair to add that Preyer who used this method realized its inadequacy.¹

In order to avoid the objection that children know many color words which they cannot speak and refuse to try, a second method was employed which consisted in naming colors to the child and asking him to pick out the corresponding color. This method was still open to the criticism "that colors might be distinguished before the word names are learned or that color words might be interchanged or confused by the child." Third, it was proposed to show the child a colored card and ask him to pick out one like it from a number of colored cards. But, as Baldwin points out, this method does not test ability to distinguish colors so much as the ability to recognize a color which has been once seen. It was evident that none of these three methods would give an answer to the question, when does the child first get the different color sensations and in what order? Some method must be devised which does not depend upon the child's knowledge of language and which does not involve a direct appeal to memory. Baldwin devised and experimented with a method which consisted essentially in placing before the child within reaching distance pieces of paper of different

¹ Preyer, *Op. cit.*, Part I, p. 7ff.

colors and recording the number of times each color was reached for and refused. The method, it will be observed at once, can be used much earlier than any of the first three described above. It can be used as soon as the child has fully developed the instinct to reach for things placed before it; as early as the fourth month in many cases. For that reason alone it is a decided advance over those used by Preyer and Binet.

Baldwin began his experiments in his child's *ninth* month, and his results are full of interest. But one may doubt that the method is adequate as a means of determining the main question at issue, and the thing he set out to determine: namely, when does the child get the different color sensations and in what order? Does not Baldwin's method test color *preferences* rather than color discrimination? Does it not test the child's interest in or liking for the different colors rather than his ability to discriminate them? Indeed, "attractiveness" is the word Baldwin used in reporting the results.¹ In short, it does not appear that the question, when does a child begin to distinguish colors, when does he begin to be conscious of color differences, has been answered by Baldwin's method, or by subsequent observers so far as the writer knows;² and one may se-

¹ *Op. cit.*, p. 53.

² See Schallenbarger's review of Baldwin's experiments in *Amer. Jour. of Psy.*, Vol. VIII., p. 560.

riously doubt that the question can be answered by the experimental method as ordinarily conceived. If experiment can be applied at all to the question, we shall have to devise a method that can be used in the very early weeks. For it seems likely that many colors are distinguished in the first few weeks. One can hardly doubt that the normal child distinguishes, say blue and yellow, almost as soon as he distinguishes light and darkness. And even with carefully devised experiments, the possibility that all apparent early color discriminations are in fact *brightness* discriminations will throw doubt upon all results whatever method is used.

The power to see color differences, like most other powers, is very feeble and uncertain at first, and is developed and perfected only after months and years of practice. So it appears that when one is asked, can the child — say three months old — yet distinguish colors? one may ask, what colors? What degree of perfection in distinguishing is meant? If one means, is the child's mental state when gazing on yellow different from his mental state when surrounded by blue? is there, perhaps, a vague awareness that the mental condition in the presence of yellow differs from that in the presence of blue? the answer would be "Yes." But if one means, does he distinguish color as well as the trained adult? the answer of course, is "No." It is probable, therefore, that Miss Shinn means a well-developed power of color discrimination when she says, "There is no certain evidence of color sense within the first year."

Teaching the child R. color names. — The first attempt

to teach R. color names was in his twenty-fourth month when I showed him red, green, and purple cards — one of each color — telling him the color of each card as I gave it to him. He remembered the names for a second or so, but soon got them confused. A number of times in this month, I also told him the color of two note-books — one red, the other black — but he was unable on the second day of his third year to name the colors of the books correctly every time. Sometimes he pointed to the black one saying, "wíd," and to the red, saying, "bătk." He had no idea of color as such. When he wanted one of the note-books he impatiently cried, "wíd, wíd, wíd," which lead me to surmise that "wíd" was his *name* for the book. On the thirteenth day, however, of his third year, he gave the names of the colors of the note-books correctly as "wěd" and "băck," and also called a red chair "wěd," and a red ribbon "wěd." Three days later, he named the note-books "wěd" and "băck," but when I asked him, what color? of two articles of clothing (which were black) he said, "wěd," showing that the words black and red were associated with the two books, and that he did not know what one meant by "color."

On the seventeenth day of his third year, I told him the color of a brass knob on a bedstead, which he was "feeling" and admiring, was yellow, which he repeated several times as "lălă." On the following day he put his

hands on the knob saying, "wěd, wěd." When I asked, what color is it? he again said "wěd." When I said "no," he said, "lälü, lälü." But when, the next moment, I showed him a watch, the case of which is practically the same shade of yellow as the brass knob, and asked him, what color is it? he said "wěd," then "băk," showing that he had merely associated the word "lälü" with the brass knob on the bedstead. "Lälü" was his name for that particular knob, and was not applied to any other objects — not even to the other three knobs on the bedstead. Two days later, however, after some effort and "nos" to his names "wěd" and "băk" when he gave them as answers to my question regarding the color of the other knobs, he called them "lälü," and took pleasure in pointing to them and saying, "lälü." Either the similarity of the other three to the first had dawned upon him, or he had associated the color and the name, "lälü," with the other three, and he afterward described them as "lälü."

On the twenty-eighth day of the third year he pointed out and named correctly black blocks in a bed quilt; but as late as the fifty-third day he called a black shoe "wěd," showing that his use of black and red was still uncertain and limited. It seemed that the words "black" and "red" were to him merely things to say in response to the question, "what color is it?"

How imperfect the idea of yellow was, and how uncer-

tain the use of the word, even after being used to describe the brass knobs for almost six weeks, appeared on the sixtieth day of the third year when he called the brass knobs one after another "lālū," but when asked the color of a gold watch-case, brass hooks, and a yellow card, said, "wěd" or "băk." Except with reference to the brass knobs, "wěd" and "băk" were still thought to be the things to say in reply to "what color is this?"

On the eighty-third day of the third year he was shown a blue dish and told its color, which he applied correctly to other blue dishes on the table. Six days later he named correctly and without hesitation the colors of a saddle and blanket on a toy horse as "băk" and "wěd"; also a coat (băk), dress (băk), tie (wěd).

By this time it seemed likely that the child could be taught colors. Accordingly, I prepared for that purpose a series of colored cards, two by three inches, by pasting Bradley colored paper on cardboard. The series included the Bradley yellow, violet, orange, green, black, gray, red, white and blue. My thought was to show him the series one at a time until he could name all of them correctly on sight. The series was given first on the ninety-fifth day of his third year, with the result that he named black and red correctly, called yellow "wěd," but did not try to name the other colors. The same day, he pointed out red and black stripes on his high-chair, but he called a yellow stripe "wěd." So it may be said that

when I began systematically, five days later, *i. e.*, on the 100th day, to teach him the names of colors of the cards he could describe properly many objects by the words "black" and "red," but he had no scruples about describing many objects incorrectly by the use of the same words. He was at any rate familiar with the names "black," "red" and "yellow." The other names were new to him, and the colors too, probably, for his attention had never been called to them, except as stated in the first paragraph of this report.

The systematic teaching and practice on the series began, as just stated, on the 100th day of his third year, and continued until the 129th, when he was able to name the series correctly and promptly. That is, it took him four weeks and one day to learn the series so he could give the name of the color of each card on sight.

The actual process of the child's learning the series can best be described by transcribing a few of my notes for the first day: —

Date. April 1, A. M. First trial.

Color.	Named.
Yellow	lēlū.
Violet	{ No answer. Looked at me questioningly.
Orange	lēlū.
Green	No answer.
Black	băk.
Gray	No answer.
Red	wěd.
White	No answer.
Blue	dweed, <i>i. e.</i> , green.

When he made no reply or replied incorrectly, I gave him the name of the color and asked him to repeat the name after me. Violet he pronounced "vī īt"; orange, "ä sū sū"; green, "dweed" or "dween"; gray, "dwāy"; white "fīt"; blue, "boo."

Date. April 1. Second trial immediately following the first

<i>Color.</i>	<i>Named.</i>
Blue	boo.
White	No answer.
Red	wěd.
Gray	băk.
Black	băk.
Green	boo.
Orange	wěd.
Violet	băk.
Yellow	boo.

At the conclusion of the second trial, I laid four of the cards, — black, red, blue and white — on a chair and asked him to bring me the cards one at a time. I said, "bring me the black one," which he did; same for red, blue, red, blue, red which he did correctly. The next time I called for blue he brought white, and when I asked for white he brought blue. It was noticed in later tests made on the first day that he succeeded better when I gave him the name and he picked out the color, than when he was shown the card and was required to think of the color name.

The exercises, or lessons with the cards, during the next twenty-eight days, were substantially the same as that of the first day, and it is not thought necessary to reproduce in detail the tables and records which my notes contain.

It was said above that the child named the series easily on the twenty-ninth day from the date of beginning the teaching. On the thirtieth day, he went through the series correctly twice without hesitation. The cards were then put away, and the child did not see them for almost six weeks when he was again given the cards and asked to name them, which he did without error. He hesitated a moment at orange and blue but did not misname them.

It appeared a few days later, that although the child could give the names of the colors of the cards, he was unwilling or unable, in some instances, to apply the color names to other objects. For example, he made no reply when I pointed to a plot of green grass and asked, what color is the grass? Nor did he make any reply when I asked him the color of some violets which I had pulled. A yellow dandelion he called äjoo (orange). But he did name correctly a carnation (wěd), a pair of baby shoes (wěd), a pair of black shoes and a white cuff. A few days later, the child was playing with a bunch of violets, a pink carnation and a handful of dandelions in full bloom. When I asked for the colors, he called the carnation, wěd; the violets, vilit; the dandelions, äjoo, *i. e.*, orange. Then I asked him to show me the "red flower," and he held up the carnation; then "violet" and he held up the violets; but when I called for yellow, he looked around saying, "no lelu," *i. e.*, there is no yellow.

Experiments to determine R.'s color preferences.—A few paragraphs may be added describing my experiments to determine R.'s color preferences. The tests were begun in his tenth month. For this purpose, I prepared ten colored cards two and one-half by four inches. The colors used were those furnished by the M. Bradley Company, the series including violet, indigo, blue, green, yellow, orange, red, black, white and gray. The child was given a comfortable sitting position in his high-chair, which had a table attachment in front. Each test consisted of holding in front of the child or laying on the table two cards, say red and blue, and recording which, if either, he reached for. The result was more satisfactory when the cards were laid on the table in front of him, and he was allowed to pick up the one which, presumably, he preferred.

Baldwin has enumerated the difficulties and pitfalls in the way of such investigations;¹ and they will not be repeated here. It is in order, however, to add that each new child will furnish the experimenter with new difficulties not encountered with other children. And the infant's resourcefulness in this regard will astonish the inexperienced.

My tests were continued through the eleventh, twelfth, thirteenth, fourteenth and fifteenth months with the negative result that, so far as this method would reveal them, the child

¹ *Op. cit.*, pp. 9, 39ff.

showed no color preferences. One day he would bounce up and down with joy and reach eagerly with both hands for a given one of two presented colors. The next day, likely as not, the rejected or neglected color of the preceding day is the one seized upon. This result is explained partially by the fact that the child soon came to look upon the cards as something to be seized, handled, and finally thrown upon the floor. The latter particularly afforded him great amusement, and it soon got to be a part of the play. The fact of increasing familiarity with the colors undoubtedly influences the results one gets by this or similar methods. For these reasons, one may suggest that the results of the early tests only be taken. But the results of my early tests are no more convincing or enlightening when taken alone than the averages obtained from all. For example, on the first day the child took red in preference to black, yellow to blue, white to purple, orange to gray, indigo to green. On the third day, the same series of pairs was used and the preferences were black to red, yellow to blue, white to purple, gray to orange, green to indigo; that is, the order was reversed in three of the five pairs. There did not appear in the six months named any constancy of selection in this series. The only conclusion that is warranted on the basis of the tables drawn up is that there seemed to be a preference for the "light" colors, but to this appear so many exceptions that the statement is hardly worth

making. Toward the end of the fifteenth month the child would look first at one card, then the other; then reach for both with both hands. The note for the 439th day reads, "There is no ground for thinking the child has any color preferences. He is more interested in what he can *do* with the cards than in their *color*."

The next note relative to color preferences was made on the 534th day and reads, "The child does not show any special liking or preference for any particular color or colors." On the 596th day it was noted, "He has never shown any preference for colored pictures, balls, toys, over uncolored ones," meaning here by "colored," the reds, yellows, blues, as distinguished from the grays, whites, and blacks. He enjoyed colored toys, vases of flowers, and the like, but did not prefer colored toys and other objects to uncolored ones. On the 623d day he was given red, blue, and yellow yarn-balls, a gray rubber-ball, and some green apples, which he called "baw." He played with all for several days, but showed no preference for the colored balls. If there was any preference it was for the gray rubber-ball; but that was due probably to the fact that it was more elastic and responsive to his throwing, handling and tossing.

Throughout the remainder of his second year, I watched for signs of color preferences, but none appeared. In the fourth month of his third year there was a period of three or four days when he was especially

interested in gray, when he would say, "moah sec gwāy" over and over. But if it was a preference for the color it soon disappeared and he lapsed to his wonted impartial liking for all colors.

CHAPTER VII

NUMBER

It is important to get a definite notion of what is meant by the "number idea" before we can ask intelligently at what age a given child acquires that idea, or about the steps by which it is reached. The simplest form of the number idea involves perceiving units, ones, and at the same time perceiving that the units have something qualitative, temporal, or spatial in common, and that they belong to an aggregate. In brief, the idea of number involves the perception of units as belonging to an aggregate. The words "two," "several," "many" relate to this elementary form of the number idea. The number idea involves not only the ability to bind together more or less firmly a series of units, but also the ability to break up a group or whole into its separate parts. A higher form of the number idea is the perception of a definite number of ones, as four, six, eight, etc. A still higher form of the idea is the comparison of groups of units, as when one says "this shelf contains five more books than that one"; or "this orchard contains eight more trees than that."

It is clear that the perception or idea of number is not the mere perception of differences of magnitude, as when

a bird misses two eggs from a nest of four; or when, in an instance quoted by Preyer, a child of ten months missed one of a set of nine pins if it was taken away, and at a year and a half knew at once whether or not one of his ten toy animals was missing, the distinction in these cases being between more and *less*—a distinction of size—not between more and *fewer*, a distinction of number.¹

Further, the ability to point to objects one after another and count them is not in itself evidence of a knowledge of number, for the reason that the counting may be imitative and mechanical. Still, it should be said that learning the number words facilitates the acquisition of the number idea.

The consensus of opinion seems to be that, strictly speaking, the lower animals do not have the number idea, though they may possess the rudiments out of which the number notion proper is developed. Romanes² relates that he taught a chimpanzee to count correctly as far as five, so that when he asked her for any number of straws fewer than six, and in any order, she would count them

¹ So acceptance of Leroy's much quoted story of the mathematical crow that distinguished between a group of four men who entered the cabin and a group of three who went away leaving the fourth to shoot the bird when she returned to the nest does not require that we credit the bird with the number idea; the ability to distinguish between the *sizes* of the two phenomena being sufficient to explain all that is said to have taken place.

² *Mental Evolution in Man*, p. 58.

out and hand them to him. Romanes did not doubt that the animal was able "to distinguish receptually between the numbers 1, 2, 3, 4, 5, and the name for each." But one may wonder what would have been the result if, instead of using straws each time, the animal's number sense had been tested with different objects, *e. g.*, pebbles, coins, leaves. Such a test would have disclosed whether the counting showed the presence of the number notion or the presence merely of a series of definite associations, each of the number words being firmly bound in the animal's mind with a certain visual impression — a given number of straws — the result of long and careful drill.

Observers of children agree that the number idea — except in the rudimentary form to be described presently — is seldom present before the fourth year. Preyer was disappointed that he could not make intelligible to his son in his twenty-seventh month the numerals one to five, and wonders "how it is that one and two, and likewise three, four, and five are confounded with one another."¹ Continuing Preyer says,

"In the twenty-ninth month, although numerals are well-known to the child, still he confounds them on all occasions, and in view of the absolute failure of many attempts to teach the child the significance of the numbers 1, 2, 3, 4, 5, one might infer that he has not yet perceived the difference between, *e. g.*, three matches and four matches; yet counting is already

¹ *Op. cit.*, Part II, pp. 165, 172.

taking place — 878th day — by putting nine pins in a row and saying, as he places each one, ‘*eins! eins! eins!*’” And Sully relates that “a child of three and a-half, generally observant and intelligent, and capable of comparing the magnitude of things, showed an almost complete inability to apprehend relations of number. Though taught to say ‘one,’ ‘two,’ ‘three’ in connection with concrete objects, he persisted in confounding number, or discrete quantity, with magnitude or continuous quantity.”¹

Assuming that the cases described by Preyer and Sully are typical — as they probably are — one would not expect to find the number notion, except in a rudimentary form, before the fourth year.

Now what are the steps in the process of acquiring the number idea? In my observations of the child R., I have tried to catch every symptom which suggested even remotely the presence of the notion of number. On the second day of his twentieth month, I tried to see what idea he could get of counting, whether the process would have any meaning for him, and, if so, what. I counted, as he stood by, a row of buttons — 1, 2, 3, 4, 5, — putting my finger on each one as I spoke the number name. He immediately went through the same motion, saying, “*lă*” or “*fă*” as he touched each one. He was merely imitating, as well as he could, a performance which interested him. If I had jumped up and down and shouted “one — two — three,” doubtless he would have tried to do

¹ *Human Mind*, Vol. I, p. 430, Appleton edition.

the same, and it would have had as much number significance as what he did do. A few days later — near the middle of the month — remembering the story of the rook and the four men in the cabin, and the story related by Preyer of the boy of eighteen months who missed one of ten toys — I thought it not unlikely that if I should purloin one of R.'s favorite toys while he was playing with them, he would miss it and make an outcry. The opportunity to try soon came. At that time one of the child's favorite plays was to put a few balls in a toy wagon and to run drawing the wagon after him. One day while he was playing in this way, and had put two balls which were alike in size and appearance in the wagon and started off looking ahead of him, I slipped out one of them. After running a short distance, he stopped, looked back at the wagon, and began to say "baw, baw," and to hunt for the missing ball. On the following day, he had *three* balls in the wagon. When he started off drawing the wagon after him, I slipped out one ball. Presently he stopped, looked at the wagon, and seemed half aware that something was wrong, but he made no outcry. So I was not sure that he had missed the ball I had taken. The experiment of taking one ball out of the wagon when there were two in it was repeated a few days later with a result like that of the first day. But if there were three balls in the wagon, and one was taken out he made no cry or showed that he missed it. Of course, this is not

conclusive that he did not notice the change. It shows only that he was not disturbed enough to make an outcry. From these experiments, it seems clear that there was no reason for thinking that R. was able at that time (twentieth month) to make the distinctions attributed to the crow, or to the child mentioned by Preyer.

Beginning with R.'s *twentieth month* we counted articles for him for his amusement, and, after a time, he learned the words "wod" (one), two, fee, fough, fize, sets — and when asked to count would speak some of those words regardless of the order in which he had heard them. They had absolutely no number meaning for the child. He had associated them in some way with the direction to "count," and when asked to count, he would point to or strike the objects saying "two," "fize," "sets," or whatever counting words came to his mind.

In the *twenty-fourth month* when asked, "how many?" of anything he had, the answer nearly always was "two," no matter what the actual number was. "Two" was the thing to say in reply to the question, "how many?" In the same month when asked to count his fingers, he said "fough" as each finger was touched. In the 106th week, counting his toes was quickly disposed of by "fough chüt," *i. e.*, four-six. Again, a note for the 116th week reads, "Counting may begin with any of the first five number names and proceed in any order." He had not even learned the correct order of the first five num-

ber words. So when he did, by chance, speak the words in the correct order, for example, when nodding to pictures and playing that he was counting them it meant no more than if he had said "mene, mini, mo."

In the *twenty-eighth month*, the child began to point to different objects of the same kind, one after another, naming each one. For example, he would point to one picture saying, "pichees," then to another picture saying, "n pichess" (the n having the sound of n when it precedes a vowel as in "not"), and meaning, "there is another picture." That is, the "n" meant "another"; thus, "n poo" meant "another spoon." A month later, "n" was displaced by "nuna." When he pointed to a second, and third and so on of objects he was naming it was "nuna poo" (another spoon), "nuna baw" (another ball), and so on. Thus, in the last week of the *twenty-ninth month* (865th day) the child came to me holding a piece of crust in each hand. Holding up the left hand, he said "bed" (bread); then holding up the right hand, said "nuna bed," *i.e.*, another bread. This was not counting, certainly, but it was a step in that direction, a step, so it would seem, toward the understanding and the expression of the number notion.¹

In the *thirtieth month*, a girl friend of R.'s entertained

¹ "The essence of counting is in just such a progressive distinction as is conveyed by 'this,' 'that,' and 'the other'; *alter* and *ἕτερος* have almost the value of numerals." — Bosanquet, *Logic*, I, p. 156. Preyer

him by counting balls, apples and so forth for him, and by having him count also. In this way, counting came to be a pleasant exercise, a play; but no record was kept of the results. On a certain day early in the *thirty-first month*, he brought three apples to me saying, "cot" (count). He counted the apples correctly — wod, two, fee. Then to test him, I asked him to bring me one apple, then three, then two. Each time, after he handed me the number asked for, I threw them on the ground and named a new number. This play was kept up for fifteen minutes with only one mistake appearing. (That time he brought three apples when I had asked for two. I said, "No, I don't want them; I want two." He walked away a short distance, dropped one apple, and returned with the remaining two.) I was pretty sure, therefore, that he knew the difference between one apple and two apples, between two and three, and between three and one. (His recent practice having been with apples, wholly, I do not know what would have been the result if sticks, blocks, or some objects other than apples had been used.) Five days later, the child made a poor showing in a test which I gave him which consisted of holding one, two, or three apples in my hand and asking,

writes on this point: "Sigismund's boy, long before he formed sentences, on seeing two horsemen, one following the other at a short distance, said 'Eite (reiter)! noch eins.' This proves the activity of the faculty of numbering." — Vol. II, p. 247.

“how many?” In this test he did not call one apple “two” or “three,” but “two” and “three” were frequently confused. His knowledge of number, so far as this test revealed it, was an association between a series of percepts and the number words — one, two, three — and was found to be not very reliable. He confused two and three in trying to number what was before him. On the seventeenth day of the thirty-first month, he answered correctly when I held up one, two, three fingers — each a number of times — asking, How many? On the twentieth day, he answered correctly when I held before him one, two, or three apples each several times and asked, how many? Similarly, on the twenty-eighth day of the month, he numbered correctly one, two, three pieces⁴ of cardboard as I showed them to him. So it appeared that at the close of the *thirty-first month* R. was able to apply the numbers, one, two, three correctly to at least three classes of objects — apples, fingers, and pieces of cardboard.

On the first day of the *thirty-second month*, the child told the number of apples I held in my hand, up to three; but when I added a fourth and said, “there are four,” he confused three and four. Four apples were called “three,” and three, “four.” When I laid three apples in a row and asked him to count them, he failed entirely. Seemingly, he had forgotten the little he once knew about counting. On the eleventh day of the

month, I held before him one, two, three, four apples each six times, asking, "How many?" He answered correctly twenty-three times—all but once—the one time confusing three and four. The next day, I used triangles cut from cardboard for the number test. One and two were named correctly, but three and four were confused, whether from listlessness or confusion or doubt, I could not tell. The following day, green walnuts were used in the number exercise with a high average of correct answers, but the child was still uncertain in his use of "three" and "four." The note made on the sixteenth day of the month reads, "The child is not successful in answering 'how many?' if objects other than apples are used." Colored cards were used on that date. One and two were named correctly, but he was uncertain when three and four were laid before him. On the seventeenth day, four colored cards—blue, yellow, orange, and green—were shown him—1, 2, 3, 4 at a time—as in previous tests. At first, he was greatly confused by three and four. But finally he "settled down" to the work and made a large number of correct answers and no wrong ones. On the twenty-sixth day of the month he named correctly groups of cubes—one, two, three and four. On the same day, I showed him five blocks and gave him the number word "five," but he soon forgot the new word, and said "fee" or "two" when I laid the five blocks before him.

On the first day of the *thirty-third month* I tried to get the child interested in counting leaves of trees; but he was either listless or had forgotten, and made more wrong answers than right. Then I tried apples, but with no better success. The counting exercise was then discontinued until the twelfth day of the *thirty-fourth month* when I tried to get him to count groups of blocks up to five. He could count one, two, three, but he had forgotten the words "four" and "five," and soon lost interest when I asked him to give the number in those larger groups. On the twenty-seventh day of the month, I tried to interest him in counting his own fingers, but he would not try, saying, "No Wa tell finnies bit" (R. cannot, or does not wish to count his fingers a bit).

Once, early in the *thirty-fifth month*, I tried to get the child to tell the number of brass knobs on a bedstead, but the distance from knob to knob was too great, perhaps, for him to grasp all at a glance — at any rate, he failed utterly in numbering the knobs. . . . The records for the remaining two months of the third year resemble that of the preceding month. Occasionally, the child was able and willing to tell "how many" of groups of blocks, or apples up to and including four. But more often he was listless and indifferent, sometimes flatly refusing to go through the number exercise. Sometimes he would suggest some other exercise or play, such as drawing or looking at and naming pictures. A few

times, he called for the blocks saying, "cot, cot" (count), but we thought it was more to get the blocks to handle, to pile up and to make "choo-choos" or houses than to exercise his number notions.

It would be fair, I think, to say that at the close of R.'s third year he had a genuine dislike for the number exercise, which he expressed by, "Wa dōt like cout ese blocks." Whether the dislike arose from being surfeited with number, or because the exercise was dull and meaningless, one could not tell — possibly both.¹

This description of the rudimentary forms of the number idea, and of my efforts to teach R. number, may be concluded by a pedagogical remark; namely, that R. was confused by the double meaning of the number words "one, two, three, four" and so on. For example, in counting a row of blocks, "three" means third in the series, while in another connection it means the total number in a group. Perhaps it would facilitate number teaching to the beginner if different words could be used for counting and for giving the numbers in groups, thus avoiding the ambiguous meanings of the number words — three, four, five and so on.

¹One verbal form which appeared first in the thirty-sixth month was curious enough to attract our attention, namely, the expression "two ones" meaning "both." Thus, if one held up two apples and asked, which apple do you want? the answer would be "two ones," meaning that he wanted both of them — if that was the case.

CHAPTER VIII

FORM

PROBABLY every one would agree with Dr. W. T. Harris that a child who recognizes "a picture of Raphael's Transfiguration as a square; the Laocoön group as a trapezium; the St. George and the Dragon as a triangle," has been excessively trained in form studies. On the other hand, we think an education is defective which does not include practice in dealing with the fundamental geometric forms. For practical reasons, civilized man is under the necessity of thinking the world in terms of simple geometric forms, and he must be able to express himself in geometric language. Geometric ideas and terminology are indispensable tools for the rapid and efficient management of the practical affairs of life.

Even if a knowledge of the simple forms of geometry had no other value than the practical one just mentioned, we should still have reason enough for the interest we find in watching the development of a child's ideas of those forms and the growth of his interest in them. But much earlier, in point of time, than the learning of geometric forms comes the recognition of similarities and differences in form as an attribute of things, and the

ability to classify objects according to form. Later, the child learns geometric forms and applies his knowledge of them to objects in the world about him ; and later still, he develops an interest in pure form independently of associations.

The first evidence that the child perceives form as an attribute of objects is found, probably, in the first recognitions of objects, which, at first, are based largely upon the perception of likeness of form. Thus a child's earliest recognitions of members of the family, of animal pets, articles of food, toys, playthings and the like are partly through the attribute of form ; that is, the new object is felt or known as old or familiar because of the similarity of its form to a well known object or article.

Many of the infant's efforts at classifying are based on form. Sometimes a few points of similarity are enough to lead the child to put in the same class objects which are very different in other respects. For example, R. in his eighteenth month used the word "mum" to name any four-legged animal — a horse, a cow, a calf, a pig, a moose,— which he saw afield. The word "baw" which R. had learned was applied (sixteenth to twentieth months) to balls, green apples, pears, green grapes, radishes, squashes — anything which resembled roughly the shape of a ball. At first, it seemed that the assimilation of those objects as balls was through touch and handling rather than through the eyes ; that is, the similarity which

the child noted of the objects called "baw," was in what could be done with them, and with their "feel" rather than in their visual appearance; but he soon began to class objects by the aid of the eyes alone. Thus form together with *use* and what the things *do* come to be the most important attributes in determining the child's classification of objects about him. Usually his classifications are broad and loose; and sometimes he goes far astray; then we get the definitions and generalizations which make the bulk of the humorous sayings of children; *e. g.*, an elephant is described as "a big thing that walks backward."

Teaching simple geometrical forms.—Beginning with the first week of R.'s twenty-eighth month, I began a series of lessons in which I tried to teach him the names of a few simple geometrical forms. The experiment turned out to be a study of the child's ability and willingness to remember arbitrary word-sounds or names in connection with what were to him arbitrarily chosen objects. It was an effort, on my part, to teach the child to utter a bare word upon seeing figures which were entirely lacking in associations. The task, on the child's part, was to associate a given word with a given visual image. It was a test of the child's ability to remember form names which were devoid of interest or associations of any kind, except that they were used in the exercise.

For the lessons, I used circles, squares, and triangles—

four sizes of each — cut from cardboard. The circles ranged in size from one-half to three inches in diameter, and the squares and triangles were approximately of the same sizes as the circles. The method, in brief, was to hold the card in front of the child and ask him to name it, recording his answer or his silence in case he would not undertake to name the card. The exercises with the cards were continued at intervals until the end of the third year. There was nothing unusual, I think, about the child's learning the names of the forms, which was accomplished in nine or ten lessons. The forms were easily distinguished, but he had some trouble at first in remembering whether a square was to be called triangle ("annie" was his name for the latter) or square (pai or peuh); that is, he did not at first associate the names "triangle" and "square" with those forms so he was able to name them unhesitatingly.

The accompanying table gives an abstract of the results of the exercise with the circles, triangles, and squares for the twenty-eighth and twenty-ninth months.

Month.	Day.	Figure.	Named.	Figure.	Named.	Figure.	Named.
28th,	5th	Circle	no answer,	Triangle,		Square,	
"	8th	"	no answer,			grimaces,	
"	11th	"		sucoo,			
"	12th	"		big sucoo,		baby sucoo,	
"	13th	"		sucoo,		big sucoo,	

Month.	Day.	Figure.	Named.	Figure.	Named.	Figure.	Named.
28th,	14th			Triangle,	sucoo,		
"	16th	Circle	no answer,	"	no answer, grimaces,		
"	20th	"	no answer,	"	no answer,		
"	27th	"	baby sucoo,	"	no answer,		
"	28th	"	big sucoo,	"	grimaces,		
29th	1st	"	big sucoo,			"	peuh (square)
"	3d	"	" "	"	" annie," "	no answer	
"	4th	"	" "	"	big annie, "	no answer	
"	5th	"	" "	"	" "	pâi (square)	
"	6th	"	sucoo,	"	annie, "	no answer	
"	9th	"	"	"	"	pai	
"	11th	"	"	"	"	" "	
"	16th	"	"	"	"	"	no answer
"	19th	"	"	"	"	"	pai
"	23d	"	"	"	"	" "	
"	27th	"	"	"	"	" "	
"	29th	"	"	"	"	" "	

It is unnecessary to copy the tables for the next seven months, since they are substantially the same as for the twenty-ninth.

In the course of the lessons with the figures, one was often struck by the fleeting nature of the child's memory for the form names. If the exercise was discontinued for a few days, or a week, the names were likely to slip away. Sometimes, he was able after some effort to recall the vanished name when the exercise was resumed ; at other times, I had to tell him. Perhaps, if the child had been exercised in applying the form names to other objects in his environment, he would have retained them much more securely. As it was, the names did not stick

because there was no reason — besides frequent repetition — why they should.

A fact similar to one which had been noticed in teaching the child the names of colors was noticed in the exercise with the figures ; namely, that mere repetition of a form-name, even as many as twenty times, was not sufficient to lodge it in memory. For example, I had him look at the figure and speak the word " diamond " twenty times. He then laid the card down, ran to the window, and when he came back — in about twenty seconds — I asked him to name the diamond, but he had forgotten — this in the thirtieth month. The child was not interested in the name, there were no associations, and frequency alone was not enough to fix the name in memory.

Application of form names. — If given a little encouragement, children, even before the end of the second year, often become very clever in applying their form names to objects about them. Thus Miss Shinn's niece, who developed a precocious interest in simple forms, " pointed out a small artificial pond in the form of an ellipse, as a ' round O ' (twenty-second month). And the record for the remaining weeks of the child's second year contains a number of illustrations of her ability to recognize and name simple geometrical forms. For example (668th day) she pulled apart the points of a hair-pin some forty-five degrees ; then, struck by its appearance, held it up and cried, ' Triangle ' ! (Ti-a?). Again

(695th day) she set her shoes with heels together and toes diverging, and said, 'Ruth shoes make triangle'; then set them parallel, — 'Now make oblong.' "¹

The few notes which my record contains with reference to R.'s ability to use his form names show a strange inability to apply them to objects other than the cardboards which were used in the exercise described above. Perhaps not so strange either — since he had never heard the names "circle," "square," "triangle," applied to any objects except the cardboards, and in that exercise the words circle, square, triangle were names of the *things* — not of their *forms* — just as "doll" and "cat" were the names of other objects. On a certain day in the early part of R.'s thirty-second month, an hour after he had gone through the exercise with the cardboards, naming them correctly, I held in front of him a square graham-cracker and asked, "What is that?" He first said, "wed," (red) then "big cackwee," but didn't notice its form. A week later, I made a number of circles, squares, and triangles with pen and ink, and asked the child to name them. He called the circles "Os," but had no names for the triangles and squares. Five days later the experiment with the pen and ink figures was repeated with precisely the same result as on the first day — such was his loyalty to the little cardboard figures. No doubt it would have been as easy for him to rob his "choo-choo" of its name

¹ *Notes on the Development of a Child*, Vol. I, pp. 66-7.

as it would to have called things, other than the cardboards, "circles," "squares," and "triangles."

Æsthetic interest in form. — This brief study of *Form* may be concluded by reference to what one may call "the æsthetic interest" which children sometimes manifest in simple geometrical forms. It happens not infrequently that little children take a pleasure in looking at and handling simple geometrical forms akin somewhat to the delight an older person derives from the contemplation of symmetry and proportion in works of art. Some of the records of infant behavior show that children, sometimes in the second year, develop a fondness for particular forms, while they neglect or even dislike others. For example, Miss Shinn states that in her niece's twenty-first month, the child's preference for oblongs and circles to squares became quite pronounced, and that at the close of the twenty-second month the child liked circles and oblongs — particularly the latter¹ — and cared nothing for squares and triangles. My observations of R.'s preferences for figures made it entirely clear that he liked the circles better than the squares and triangles, as shown by his frequent calling for the circles, his desire to have them to handle, and by his manner of talking to and about them.

¹ Miss Shinn was of the opinion that, "The interest in the oblong . . . was probably simply due to convenience in holding; the oblong tablets fitted her little fist very nicely, and she was solicitous to have them laid in an even pile therein." — *Notes*, Part I, p. 64.

CHAPTER IX

ASSOCIATION

THE word "Association" as used in functional psychology refers either to a process or to a relation: as a process, it means the binding together the elements of mental experience into groups, more or less complex, and having greater or less stability; as a relation, it refers to the state which exists between the parts of that same mental experience when the revival of one of the parts tends to revive other parts. James describes "Association" as one of the four "ultimate foundation pillars of the intellectual life," the other three being discrimination, retentiveness and the faculty of perceiving likenesses. That is, it is of the essence of mind to retain the results of its experiences (retentiveness), to note differences and likenesses (discrimination and comparison), and to combine the elements of experience into more or less complex wholes. These processes constitute the essential nature of mind, particularly on its intellectual side. We may, therefore, consider Association, with which we are at present concerned, (the "faculty" or power of "binding together," "combining," "uniting," "integrating," "synthetizing" are other equivalents used by psycholo-

gists) as a fundamental function of the mind. "The mind," as James puts it, "is essentially an associating machine." A mind which does not associate, a mind in which associations are not and cannot be formed is described as an idiotic or feeble mind.

One of the most striking things about the attempts to teach feeble-minded children is the difficulty of building up and fixing associations in the minds of these unfortunates. The links or fibres (if there are such), which bind together the several items of such a child's experience are like ropes of sand — no sooner are they formed than they fall to pieces. Teachers in schools for the feeble-minded often spend a whole year in teaching a pupil to place red balls in red cups, white balls in white cups, blue ones in blue cups, the task being to remember that the red ball goes in the red cup, the blue one in the blue cup and so on; and when finally the task is mastered it seems more like a muscular habit (the balls and cups always being set before the child in the same order), than a mental association. One of the sure tests then of the soundness of a child's mind is the possibility of forming associations having a high degree of permanence.

We may say, therefore, that mental development on its intellectual side is, in part, a process of building up associations, of combining sense-experiences, percepts, and ideas into coherent wholes, of uniting ideas into clusters, and of discovering laws and general principles. The associative process is present at every stage of intellectual development from the first, crude, tentative beginnings of the infant's associating certain tastes, touches, muscular

sensations — and possibly odors — with the satisfaction of hunger up to the highest and most imposing creations of scientific or artistic genius. And it may be said, conversely, that mental development cannot go on in a mind which cannot retain and combine its experiences. A child may have an abundance of sense-impressions, but we cannot speak of the child's mind as being in a process of development unless these impressions are being woven into coherent wholes. In brief, mental development in the individual in one of its essential aspects, is a process of uniting, combining the elements which form the raw material of the individual's mental life. In the paragraphs which follow we shall try to show what the earliest associations formed by an infant are like, and how they are formed.

At this point, a word is in order regarding the general nature of the child's first associations, and particularly with reference to the manner in which his first ideas of things are formed. From some accounts of the way in which the child mind builds up its ideas, one gets the impression that it is by a process of uniting sense-impressions with one another until the list of originally discrete sense-products or attributes is woven or fused into a whole which is the idea of the thing. One's idea of a rose, a pebble, an orange is formed, according to the Associationist's description, by each sense furnishing one element which is associated with the material furnished

by other senses, "such association," to use Bain's words, "when matured and firm, is (being), our idea, our intellectual grasp of the pebble," rose, orange — what not.¹ So, according to this view, a child forms his idea of an orange by getting first from the different special senses the particular qualities or attributes of the orange — color, form, taste, smell, weight, temperature, and a certain touch sensation — and then combining these disconnected elements into the idea of the orange.

Now we should certainly go very far astray if we should accept this, the Associationist's account of the formation of our ideas, and think of the baby's first mental processes as consisting of separate, definite, clean-cut sensations of sight, touch, sound, taste, temperature, which later are fused into coherent wholes called "perceptions" or "ideas." James' description is much nearer the truth. "The baby," he writes, "assailed by eyes, ears, nose, skin, and entrails at once, feels it all as one great blooming, buzzing confusion." The same thought is generalized by James as follows: "Any number of impressions, from any number of sensory sources, falling simultaneously on a mind which has not yet experienced them separately, will fuse into a single undivided object for that mind. The law is that all things fuse that can fuse, and nothing separates except what must."² This certainly gives one

¹ See James, *Principles of Psychology*, Vol. I, p. 485.

² *Op. cit.*, Vol. I, p. 488.

a truer conception of the baby's mind in the early days and weeks than to think of it as made up of a vast number of disconnected sense-experiences. And yet, almost from the first, differentiation within the "blooming, buzzing confusion" does take place, some parts stand out more prominently, and these are fused with other prominent parts or factors of the total experience. Associations are formed almost from the first.

These earliest associations, as we should expect, relate to the food-taking process, which, to the child, is the most interesting and most important function of this early period. Thus, the first association which R. formed — semi-organic no doubt — was between a given position in the mother's arms and the act of nursing, first noted on the fifth day. The child was crying from hunger and when laid in the mother's arms in the nursing position, ceased crying and began to utter a little note of anticipation (impossible to describe in print) of contentment in vague expectation — so it seemed — of the meal. The observation was repeated on the tenth and twenty-seventh days with results which confirmed the accuracy of the earlier observation. Even as early as the second day the child J. began to move the lips and head as if to get the breast as soon as he was laid near the breast in the nursing position. This note was verified on the fourth, fifth, and seventh days so as to leave no doubt that the

child made efforts to get the breast as soon as he was placed in a position for nursing. Tiedemann thought he saw the beginnings of association on the eighteenth day; thus, when a soft hand touched the face of a crying child he ceased crying and put himself in the position for taking food.¹ Observations similar to these already mentioned were made by Miss Shinn in her niece's fourth week; for example, that the child when crying with hunger would hush as soon as she was taken in arms in the position usual in nursing, "as if she recognized the preliminaries and knew she was about to be satisfied." "It was not memory," Miss Shinn continues, "but a clear instance of the working of that great law of association." The "feeling" of that particular position had become associated with the feeling of satisfied hunger. From these observations it appears that an association between the act of nursing and the position for nursing is formed very early, well within the first month, and often in the very first days. To be sure, in these early days, we have difficulty in telling whether we have a true instance of association or merely instinctive behavior. It is possible that the child's first wriggling to get the breast is set going by touch or odor rather than a faint fore-feeling of the act of nursing and satisfied hunger. And yet with a full recognition of the difficulty of describing exactly the

¹ Quoted by Tracy, *Psychology of Childhood*, p. 52.

state of mind of a two weeks old infant, we may say with a fair degree of confidence that during the first two weeks the various steps in the food-taking process become blended so that the appearance of one tends to revive the others.

By the end of the first month, Miss Shinn's niece had distinguished between being alone and being in a room with people, and between being held in the lap and being laid on a couch. Stated generally, the first instance means that the disturbance of the customary state of things—being with people—caused a feeling of uneasiness; and the second, that "associations of pleasure had been formed with the lap, and she felt a vague discomfort in the absence of these." (These last mentioned associations might also be described as examples of "habit memory" which will be taken up in the next chapter.)

The associations which are formed during the first month are largely physical, organic in nature. Whatever consciousness accompanies them is dim, vague—is more a feeling than a clear apprehension of the factors involved. When we pass to the second month we find that the associations, while still centering, in the main, about the food-taking process, show advance in number and range, and in clearer definition of the factors entering into the association groups. Miss Shinn observed that her niece, when six weeks old, if fretting

with hunger ceased crying as soon as she was lifted to be taken up, and a few days later "the child would hush crying from hunger as soon as her mouth was washed out—a ceremony that invariably came before nursing." In this instance there was an association apparently between certain sensations in the mouth and the idea of her meal.

Early in the *third month*, R. had associated nursing with certain preliminaries to his getting his meals, and made a peculiar, fretting, grunting cry when the breast was being prepared; but the sight of the breast was not enough, at that time, to suggest the act of nursing. Other associations which showed a marked advance both in the number and in definiteness of the factors involved in the associations formed were:—(1) between the sight of objects held over him and the desire to touch them with his fingers. That is, when an object—as a watch—was held over the child his hand would go toward the suspended article as he gazed at it. This as we saw in another place (p. 24f.) was an early step in the process of learning to grasp at whatever was near him, a coördination which was not perfected until much later. (2) About the same time, the child would look at and "feel" his fingers by the half hour. This exercise must have started the welding in the child's consciousness of the sight of his fingers with their "feel." In the last week of the third month,

it was noticed that the touch of an object set up the desire to clasp it. It seemed that he had learned that whatever could be touched could also be clasped; touch pulled the "clasping trigger." In the same week, the child recognized his nursing bottle. Whenever it was held over him he uttered little, fretful, half laughing cries until it was given to him. Another association which was more of the nature of a reflex, and which appeared early in the month was between clasping one's garments and pulling at them. In the earlier weeks, if an object which he had clasped was given the slightest pull, he would let go; now he holds on and pulls. In this month, we saw also the first steps towards looking for sounds. As early as the sixty-eighth day, if one stood outside the child's field of vision and shook a rattle or rang a bell, he would move his head about as if looking for the source of the sound. "Yet," as the note reads, "these first wrigglings may have been due to restlessness, a mere disturbance, such as sounds will produce, particularly strange ones, in the very early weeks." On the seventy-third day, I stood to the left and in the rear of the child's crib so he could not see me and spoke to him. On that occasion, there could have been little doubt that he was trying by turning and wriggling about to find the source of the sound. He likewise turned when I stood in the same place and rang a small breakfast bell. He had often heard my

voice and he often had the bell as a plaything, and it seemed probable, that the voice-sound and the bell-sound had blended in his mind with some sort of visual images which were revived in the experiment.

Miss Shinn, with her usual exactness and appreciation of details, describes a number of associations which fell within her niece's third month. In the last days of the month, her niece completed "a chain of association" made up of certain groping movements of the hands toward a spool or rattle, feelings of touch, feelings of clasping and lifting, and finally "more lively and pleasing" feelings in the mouth. She did not, however, yet look at the objects so grasped and carried to the mouth; "the sight-motor and touch-motor series had not yet coalesced."

In the fourth month, J. associated the act of clasping his nursing bottle with the act of carrying it to his mouth. As soon as his hands were around the bottle he tried to get the nipple in his mouth. We have already spoken of the beginnings of the grasping movement. By the end of R.'s fourth month, he seldom failed to grasp at objects held over him within reaching distance (p. 26). The sight of a near-by object was associated with the grasping movement. That is, the sight-motor and the touch-motor series had coalesced.

Miss Shinn, after quoting John Fiske's generalization that, "Vision and manipulation — these in their countless and indi-

rect and transfigured forms are the two coöperating factors in all intellectual progress," gives an excellent illustration of the way these two functions — vision and manipulation — coöperate to extend the baby's first ideas of the world of concrete things. I quote the entire passage :

"The first great result is the completion of vision itself. It cannot be doubted that it is mainly by studying objects with eye and hand together that we get our ability to see solid form. A colt grasping his ear of corn with his teeth, even a puppy licking and turning his bone all over, or a kitten tapping a spool to and fro and hugging it in her paws, without losing sight of it — none of these can bring the united powers of three senses to bear on an object so perfectly as a monkey or human baby can, holding it in the most convenient positions, turning it this way and that, seeing every part, feeling it with finger-tips and mouth ; and it is doubtful if the quadrupeds ever attain to as clear a sense of form as we do."¹

In the fifth month the child R.'s mental life was mainly in a world of sensations and sensation complexes, the gains in the field of association being increased knowledge of the sense attributes of objects — gained through sight, touch, hearing, muscular sensation and so forth, and the fusing of

¹ *The Biography of a Baby*, p. 144.

NOTE.—Darwin says that his boy, in the fifth month, associated having his wraps put on with going out of doors. We watched for signs of a similar association in R.'s mind for three months beginning with the fourth, but saw nothing of the kind. The child nearly always became fretful when his wraps were put on, and particularly his hood which he disliked very much to have on his head. I thought as I watched the child that possibly Darwin had mistaken fretfulness arising from dislike of being dressed for crying because he was not taken out of doors. At any rate, it was not until the twelfth month that we had clear proof that dressing R., and getting his carriage ready aroused in his mind an anticipation of an outing.

these attributes into ideas of objects more or less distinct; also in increased abilities to sense direction and to judge distances. . . . My notes on Association for the sixth month are so meager that I am obliged to go to Miss Shinn's full account for illustrations of the working of the associative process in that month, with the remark that beginning with the sixth month Miss Shinn's niece's development was so rapid compared with R.'s that further comparison of the development of the two children is impracticable. In this month, Miss Shinn's niece began to throw things on the floor to see them fall, a movement which I did not see in either of my children until the ninth month. She also associated the idea of a spoon with milk in the spoon. When given a spoon for which she had been asking she was still discontented, "till we found that she wished to have milk in it as she knew befitted a spoon—though for the milk itself she did not care at all." In the same month, Miss Shinn saw the beginnings of language, both sign language and spoken language, which in an important sense are dependent upon the associative process. For example, the sound of her name (Ruth) had become associated with "interesting experiences—with frolics and caresses, and trips outdoors, with relief from discomforts, with dinners, and all the other things that happened when people were attending to her." Hardly less precocious was the child's making signs by pulling at a table-cloth to tell her aunt that she

wanted to be placed upon the table in order that she might repeat the interesting creeping experience which the child's grandmother had furnished a few hours before. This was a clear case of memory; she remembered the experience of the earlier hour, or, in association terms, the sight or "feel" of the table-cloth revived the sensations of creeping on the table, of being held, and all the other interesting things a grandmother would throw about the training. . . . Only one note from my record for the sixth month properly belongs in an account of the development of association,—namely, that early in the month the child R. had formed a firm association between grasping one's fingers and being pulled to a sitting position. He had been helped to a sitting posture so often by being allowed to clasp our fingers, then pulling, that finger clasping now suggested the pull.

I have no notes on Association for the seventh month. Two observations of the eighth month were that R. associated his shaking a bell and a newspaper with the sounds which they made when shaken. The muscular and tactile sensations of shaking had become associated with the sound made by the paper in the one case, and with the ringing of the bell in the other.

We have seen in the discussion of "Reaching and Grasping" (p. 22ff.), that that function was well established by the beginning of R.'s fifth month. By the *ninth* month, reaching for things had become almost a mania;

the child wanted to get his hands on everything he saw. The sight of an object set the reaching process going. Another association was between the sight of a person coming near his crib and being taken up. Whenever one went near his crib he would stretch up his arms to be taken. Another more noticeable association was between the sound of footsteps outside the door of his room and the idea that some one was coming into the room. When the steps were heard, the child would turn toward the door in expectation. In this month, as has been stated already, the child first looked for objects which he let fall on the floor, seeming to understand that an object which had fallen from his hands could be seen by looking downward.

A somewhat more special form of the watching-door-for-person association was formed in the *tenth* month when the child, if hungry, would eagerly watch a certain door through which his food was brought after being prepared in another part of the house. If footsteps were heard in the direction of that particular door his face assumed a marked expression of anticipation, which quickly passed into one of keen disappointment if the milk was not forthcoming.

An observation made in the last week of the tenth month (and already reported in another connection, p. 92), showed well how closely the child's associations were bound up with and limited by his experience, and

with what difficulty he was able to get beyond that experience in seeing relations, as follows: the child was startled by the shrill whistle of an approaching locomotive; but since he did not associate the sound of the whistle with the sight of the locomotive the momentary alarm which he experienced did not spread to the sight of the engine, and he continued to watch it with the same keen interest and pleasure which preceded the shrill whistle; whereas, it seems likely that if he had located the source of the whistle in the engine the latter would have been viewed with increasing alarm the nearer it approached.

By the beginning of R.'s *eleventh* month, associations were forming with great rapidity, the newest ones being in the field of language. A number of observers report associations between objects and the spoken names of the objects before the end of the first half year. And it is even more frequently noticed that children begin early in the second half of the first year to understand requests which others make of them. The child R., whose language development was relatively slow, did not show that he understood the speech of others until the eleventh month when he first understood the request, "say so and so." Thus, if one said to him, "Say baba," or any similar simple combination, the child at once tried to do as suggested. He seemed to know what was expected of him when he heard the words, "Say so and so"; or per-

haps it was not the separate, distinct words which he understood so much as the particular emphasis on the final word, the copy, which set up the speech activity on his part. It was, at any rate, an association between a certain sound which he heard and an effort to repeat the copy. Other associations of the month were between the squeeze of a toy and its squeak. (In this connection a word of caution is in order. At first thought, when watching a performance of this sort, one says, "why, of course the child squeezes the toy in order to hear the squeak." But reflection will show that the case is not quite so clear as seems at first sight. It is entirely possible, even likely, that during the first few times this movement is performed there is no association at all between the muscular feeling or sensation and the sound which the squeezing motion makes. The child by accident gives the toy a squeeze and the sound results. But we should be in error to think that the next squeeze which he gives the toy is in order to make the noise. On the contrary, it is likely that the second and many succeeding squeezes are merely continuations of the first motion owing to a kind of inertia of the muscles which keeps them going in a particular way when they are once set going. At first, the squeak is not related to the squeeze, and if it does not cause fright, as in the case of Champneys' boy, its influence on the tendency to repeat the pressing motion is *nil*. The squeezing motion is contin-

ued because it is pleasant and because of the principle of inertia already mentioned. But after a time, doll-in-hand does suggest the squeeze in order to hear the squeak.) Another association of R.'s eleventh month was between the sight of an open hand extended toward him and the act of putting whatever he happened to have in his hand in the extended hand. This was an association which had been built up by a course of training, as follows: Very often the child got hold of dangerous articles like pins, knives, forks and so on, and instead of taking them from him he was taught to put them in our hands.

In this connection it is of interest to note that while some of R.'s associations were between percepts and memory images, that the greater number, in the first year, were between percepts — usually tactile, visual or auditory — and definite, uniform, motor responses on the child's part, such associations as the one just mentioned — sight of an open hand held toward him and placing in it whatever he had in his own hand. (We have in mind here reactions only which have been learned, excluding reflex and instinctive actions.) Among the earliest actions of the latter class, *i. e.*, actions which followed sense-percepts, were — shaking a newspaper as soon as he got hold of one (eighth month); turning toward a door when he heard steps in the hall outside (ninth month); pulling at a drawer-knob to get a drawer open (eleventh

month); squeezing a doll to make it squeak, putting things in an open hand extended toward him (eleventh month). To this class of associations belong also instances of R.'s understanding and carrying out another's verbal requests like—lying down and closing the eyes when one said to the child, "go to sleep," which was noted in the *twelfth* month. To the same class belong also naming things on sight, numerous illustrations of which are given in the chapter on Language. A given sensation calls forth a definite motor response. The child sees, hears or gets his hands on a given article and speaks its name. The sensation revives the verbal reaction. One more illustration of this class of associations, percept-motor, was noted in the twelfth month as follows: a hair-brush in his hand was followed at once by a rough attempt to brush his hair, rubbing the brush over his head in rough imitation of one brushing the hair.

In R.'s twelfth month the growth of the language association group was of most interest. By the end of the first year the child had learned the names of a few objects which he saw daily and whose names he frequently heard, *e.g.*, "street-car" and "bird." He had also associated the request, "Warm your hands," with the act of holding out his hands as one does in order to warm them. This had been taught the child by speaking these words to him, and at the same time hold-

ing his hands in the proper position for warming. The child learned also that he could get a desired object which was concealed in another person's hand by pulling away the fingers one at a time until the object lay in full view. For example, if one showed the child a locket or bright coin, then laid it in the hand and clasped the fingers over it, then held the hand so the child could tug at it, he would work, pulling up one finger at a time until he got the article. He also learned that if an article which he saw one holding was not found in one hand it was likely to be found in the other. Thus, if one clasped a coin in one hand, then gave him the other hand to tug at and open, he would work faithfully until he opened the empty, deceptive hand; not finding the coin, he would then grasp the other hand and continue his search. It seemed that his mind acted somewhat as follows: the closed hand meant or suggested, as the result of former experiences, that it contained a coin or locket; the sight of the closed hand suggested "something is in it." The examination of the one does not verify this; but the association between the sight of the closed hand and the idea of its contents persists and he acts on that; that is, begins to tug at the second hand.

We have now followed in outline the process of forming associations through the first year. We have seen that the early associations are between large, poorly defined blocks of sense-experience. Later we found

combinations between smaller and more clearly defined sense-impressions ; and still later we saw the blending of percepts and definite motor responses ; also of sense percepts and images. We have found only a few clear and unmistakable instances of the revival in consciousness of one image by another. There were numerous instances of percepts calling up images, but few of images reviving other images. We shall not at this point follow the process of association further for the reason that later development follows substantially the same directions as those already indicated ; and also for the reason that activities of the second and third years which involve association are classed more easily under other topics, particularly Memory, Language, and Imitation.

CHAPTER X

MEMORY

A MEMORY image may be described objectively as a mental image which resembles closely a former image, a real thing, or event. Subjectively regarded, memory images of developed minds are accompanied by the feeling of familiarity, or mood of at-homeness, as Titchener describes it, and also by the belief that the image relates to a real object, event, or situation, and still further by the consciousness that the object, event, or situation is not at the moment present to the senses.

In this chapter we shall first describe some of the rudimentary forms of memory, the processes out of which memory proper develops ; second, we shall indicate some of the more striking differences between the memory of the adult and that of the infant.

RUDIMENTARY MEMORY

Memory is often described as the fundamental process in mental development, the meaning being that if the results of mental experience were not retained, related, formed into groups, revived and recognized, the essential process in mental development would be lacking : we should have a series of separate, independent mental

units, but not a developing mind. One may go even further and maintain that if there were no memory there could be no mental experience, no consciousness whatever.¹ The mere awareness of a sensation—say of touch or temperature, it may be said, is proof of the existence of what one may call “elementary” or “individual” memory; it involves the consciousness of difference—a rudimentary form of judgment—and this in turn presupposes an awareness of two conditions—a past in memory, and a present.

Excepting the elementary memory just referred to as the presupposition of all mental experience, probably the first phenomena in the line of ascent toward developed memory, the first, crude beginnings of memory, are found, as we have seen in the preceding chapter, in the earliest associations relating to the food-taking, and other organic processes. Other rudimentary forms of memory which make their appearance during the first year are: first, “habit memory” as Miss Shinn calls it; second, primary memory images; third, imitative memory. It is not supposed that this list is exhaustive of the primitive forms of memory as found in infancy and early childhood: it aims only to include some of the forms and

¹ This, I take it, is the meaning of Wundt's statement, that “to prove mentality we must be able to prove a persistence of the sense-impression,—some form of memory, however elementary.” — *Human and Animal Psychology*, English trans., New York, 1894, p. 347.

conditions which precede and are fundamental to memory in the developed mind. Each of the early forms of memory just named will be considered briefly on the basis of my own observations, and comparisons between my own and other records — chiefly that of Miss Shinn.

*Habit-memory.*¹ — Habit-memory exists more as a feeling than as a clear apprehension. Examples of habit-memory are found in the comfortable feeling which the baby experiences when his surroundings are familiar, and in the feeling of discomfort which he experiences when abrupt changes are made in his surroundings. Miss Shinn reports the appearance of habit-memory at the end of her niece's first month when the child showed consciousness of the difference between solitude and society. The fear of strangers which makes its appearance often as early as the third month is due to habit-memory. For example, R. in the seventeenth week became very sober in the presence of strangers. Previous to this date most, though not all, strange faces were greeted with a smile like that which greeted the faces of members of the family. Other evidence that R. was beginning to take notice of the breaks in the uniformity of his surroundings, and so in a way to remember, was witnessed in his ceasing to play and remaining very quiet if one made

¹ The term "habit-memory," no doubt, is open to criticism; but, in the absence of a better one, it may serve as a general name for the facts noted.

strange noises in another part of the house, as when driving a nail, or pumping. Perhaps one of the earliest formed habit-memories is that of being comfortable in warm, dry clothing and of being uncomfortable if the clothing is cold or damp, noticed first in R.'s fourteenth week.

Primary memory images. — Another rudimentary form of memory is the image or "after-shine," which forms the connecting link between the percept and the memory image proper, and which is distinguished from the memory image mainly by the fact that it has not been organized into the body of the child's permanent experience, and also by the fact that the relation to its object is immediate. For instance, Miss Shinn relates that her niece in the thirteenth week "looked about searching for a lively young girl with bright colors who had been laughing and prattling to the baby, but who owing to a change of position had been lost to the baby's sight." There persisted in the baby's mind, for a few moments, a sort of after-shine of "Miss Charmian" after she had disappeared from vision. "And yet," Miss Shinn observes, "it was not true memory, it was not an idea coming back to the mind after an interval." In R.'s tenth week it was noticed that he became fretful when a light at which he had been staring was shaded, or when he was turned away from the light. In these cases, it seemed probable that an image of the light per-

sisted for a moment after it disappeared from direct view. In the fourteenth week, R. showed clear signs of displeasure when toys, particularly a tin rattle and a bell with which he was playing, were taken from him. In these cases there must have been a temporary persistence of the images, vague and faint no doubt, of the toys which had disappeared. A similar displeasure at the disappearance of a pleasure-giving thing was observed in R.'s eighteenth week when a newspaper which he was shaking was taken from him. This observation was verified in the twentieth week. The image which lingered in this instance, very likely, was a combination of tactal, muscular and auditory images, rather than visual; he missed the pleasant muscular, touch, and hearing sensations, which the paper gave more than the sight of the paper. Again in the fiftieth week, the child cried loudly when a big red apple with which he was playing was taken from him. That the image of the apple was fleeting and not hard to displace was shown by the fact that he was easily quieted by being given something else with which to play. These examples which might be multiplied indefinitely will serve to illustrate the after-image form of memory, and also to show that it makes its appearance very early.

Imitative memory.—There is a trace of memory in all imitative acts except those described elsewhere as reflex imitations. In order consciously to imitate it is neces-

sary to remember, at least for a moment, the thing imitated, and conscious imitation occurs frequently, as we saw in the chapter on Imitation, in the latter part of the first year. In the latter part of the eighth month (240th day) R. tried to imitate his mother's putting a newspaper over her head, sunbonnet fashion, a play which gave him great pleasure. This imitative act was a decided advance over the sympathetic smiles and laughter of earlier months in response to the smiles and laughter of the child's companions, and required some memory for its performance. In the latter part of the ninth month (271st day), in order to amuse the child, I was picking up and throwing down in front of him a small tin box. At first the child sat laughing at the play, but presently he reached over, picked up the box and gave it an awkward toss as if trying to throw it as I was doing. This he repeated over and over. By the forty-eighth week, shaking the hand in imitation of one's waving a good-bye, a movement requiring a trace of memory for its performance, had been acquired. Other instances involving a memory factor, and appearing well within the first year were,—holding the head to one side, nodding the head, pronouncing short syllables like *bă* and *dă*, brushing the hair, and so forth. R.'s second year witnessed an increasing number of imitative actions which involved larger memory factors. For example, picking up and putting his toys in a certain drawer (fifteenth month), after watching his mother perform this

service for him on a number of former occasions. In the same month, the child got hold of a newspaper and held it before his face mumbling after the manner of one reading. Further illustrations of imitative acts involving a memory factor may be found in the chapters on Language and on Imitation.

DIFFERENCES BETWEEN INFANT AND ADULT MEMORY

In the remaining paragraphs of this chapter, we may consider some of the differences between the memory of the infant and that of the adult. (1) First, we may speak of the lack of continuity, the so-called weakness of the infant's memory. When we speak of the adult's memory as being stronger and as having greater continuity than that of the infant, we mean that the mental impressions of the adult are retained for a longer period, for weeks, months, years, or to the end of his days; whereas, the baby remembers for only a moment or a few seconds. We say that the impressions on the infant's mind fade away almost the instant the stimulus ceases. Compayre likens the little child's mind to "a delicate painting which the brush must pass over several times in order to keep the fleeting colors, always ready to disappear"; and again to the moving sands of the seashore,—"in vain do you mark them with your footprints as the wave recedes, the returning wave effaces all." The explanation of the fleeting character of the infant's mental impressions is found

in the fact that the associations which are formed are weak and unsubstantial. As was said in an earlier paragraph, the bonds of association are like ropes of sand: unless they are continually rebuilt they fall away.

A certain personal and psychological interest attaches to the question, when do associations begin to form between the parts of a given child's mental life, so that although weeks have passed since the associations were formed or renewed the reappearance in consciousness of one of the links will revive the others with their attendant mood of familiarity. Put in another way, the question is, how early may we find associations which persist beyond the moment and which endure although they are not continually renewed? My own observations on this point, though far from being as thorough as one wishes, still will serve to indicate the directions in which one might look for answers in the case of an individual child. On R.'s 411th day (fourteenth month) he was playing with a ball, rolling it, crawling after it and so on. After awhile the ball rolled under a couch out of easy reach and he went about other play. A half hour later, in order to see whether he would remember where he had last seen the ball, I said to him, "Get the ball, R." He at once crawled to the couch, got down on his stomach and struggled until he fished the ball out. This was the first time we noticed that he remembered anything for more than a few seconds, though there must have been earlier instances not noted.

Compaye quotes from Egger's record a similar observation: "At that age (fifteen months) Emile seizes a toy that he has left or hidden under a chair; a quarter of an hour afterward I asked him for it; he goes straight to the object and brings it to me."¹ Two notes made in R.'s eighteenth month show that he remembered interesting plays for periods of twenty-four hours, or more, as follows: On a given evening one of the child's friends amused him by showing him how to roll a ball in his dress. The next evening the child got a ball and tried faithfully for a quarter-hour to roll the ball in his dress as his friend had on the preceding evening. On the same evening the child pulled grass and scattered it over his clothes as his mother had done three evenings before. A note from the record for the nineteenth month shows the child's ability to remember places, as follows: On the twelfth day of the month he was entertained by being allowed to look over a collection of photographs. After he had them for a time they were taken to another room and placed out of his sight. Four days afterward he thought of the pictures, went into the room where he had seen them taken, and reached toward the shelf on which he had seen the pictures placed. He had not seen the pictures, and, so far as we knew, had not thought of them since he had them four days before. The child's mem-

¹ Compaye, *The Intellectual and Moral Development of the Child* (Appleton Edition), Vol. I, p. 224.

ory for names heard once was also increasing. On a certain evening in the latter part of the nineteenth month, I pointed out and named the moon for him. Three evenings after, he accidentally caught sight of the moon, reached toward it, and cried "moom." The name "moon" was remembered during the interval of three days. In the same week he recalled, after two days, the sound "bă ā" which he had heard when given a toy lamb. In the twentieth month, it was noted that one lesson was enough to teach the child to loosen the latch and pull open an inside window-shutter. After one lesson he also remembered for three days to get a cane and knock a ball from under a bookcase.

In the cases of remembering just cited we may suppose that the associations had not been renewed since they were first formed; that the child had reached the age when impressions and associations persisted for several days even when they were not renewed in the interval. It is perhaps unnecessary to follow the record further month by month. It shows that an increasing number of experiences were selected and remembered for longer and longer periods. Of course, it is not to be supposed that the child remembered all things — names, actions, where playthings were left, where people live, persons he had seen, whether food was good and so forth; in fact, the things he did not remember far outnumbered those which he did, and his failure to remember some

things and persons was as striking as was his ability to remember others. Thus in the twenty-first month he failed to recognize one of his particular friends upon her return after an absence of five weeks.

Children differ greatly in their ability to remember friends and members of the family after they have been away from the child for a period. Compayre quotes from Perez the case of a child one year old who after a month's absence from home recognized "a good old servant coming toward him; even before she had spoken his name he smiled and held out his arms to her, fairly leaping with joy."¹ Tracy tells of a little boy twenty-three months old who recognized him after an absence of nearly three weeks. Tracy² also quotes the unusual case of a child four months old who knew his nurse after an absence of four weeks.³

A few illustrations from the record for R.'s third year will suffice to show the increasing tenacity of the child's memory. One evening in the first week of the twenty-

¹ Compayre, *Op. cit.*, Vol. I, p. 214.

² Tracy, *Op. cit.*, p. 50.

³ The case last cited raises a doubt whether the circumstances were observed with enough care to guard against all possible error. Some children who are not discriminating as to the appearance of human faces will often regard a new face not as new, but as resembling one that they see daily. We know how easy it is for a child to mistake a stranger for a member of the family, even his own mother or father. So it may be that some of the instances of apparent recognition are not really such, but rather instances of failure to discriminate between the appearance of the person who has returned after an absence and other persons whom the child has seen all along. In this connection, see record of an experiment in Baldwin's *Mental Development*, p. 316.

fifth month, R.'s grandfather gave him a toy and spent the evening in showing the child how to play with it. The toy — a fragile one — was then put away and grandpa returned to his home. When, after an interval of two weeks, the toy was again given to the child, he said, "Dähaw" (his name for grandpa), showing that the sight of the toy recalled his grandfather, or rather the play with the toy. . . . On the fourth day of his twenty-ninth month R. gave us a great surprise by exclaiming, "Maggie hut eah." Now Maggie was a girl who had worked in the house for a week more than three months before, and who, after the manner of many foolish persons, had told the child she would cut off his ears if he didn't do so and so. At the time, the child did not seem particularly alarmed by the threatened dismemberment; he seemed more impressed by the novelty of the idea of having his ears taken off, although he also gathered the idea that the operation would be more or less unpleasant, that it would "hut," as he afterward said. In the first week of the thirtieth month the child recognized and named at once his grandfather after an absence of five months. Of course, in this instance it was not a clear case of "out of sight, out of mind," for he had often thought and spoken of his grandfather in the interval, and on a number of occasions he had mistaken gray-haired men for his grandfather. . . . During the twenty-eighth and twenty-ninth months, while carry-

ing on the experiments with the colors and pictures described in Chapters VI and XIII, I had kept the cards and pictures in my study, and had made the experiments in that room. In the first week of the thirtieth month the child went away for the summer and did not see or, so far as I know, think of the colored cards or pictures again for a period of six weeks. I then got out the cards and asked, "Where did you used to see these?" He answered at once, "Papa's oom"; that is, in papa's room. The cards were associated with that particular room. . . . In the last week of the thirty-fourth month he remembered, after an interval of seven weeks, that he had seen, "pigs in böñ" (barn); that is, pigs in a shed at a live-stock exhibition. In the same week he pointed to a book on a shelf in my room saying, "Papa have uh book Găma C.'s"; *i.e.*, papa had that book at Grandma C.'s. He remembered that I had that particular book at his grandmother's where we spent a part of the vacation two months previous. In the thirty-sixth month the child related without suggestion a number of his observations and experiences of three months before. Among them were two interesting memories of a "dog show" that he had witnessed in the preceding autumn, as follows: "wow-wow on mukey" (a wow-wow sat on a monkey); and "ephut on tool" (an elephant sat on a stool). Another—"one black man on uh choo-choo, hup Wa (helped R.) on uh choo-choo"—referring to the

porter who had helped him on and off the train when he was returning after his summer at his grandmother's. He was also impressed by the seemingly prosaic incident of an expressman's calling for his mother's baggage, and he related eight weeks afterward with great color that, "Man git mamma kucks (trunks)—put on wagon—know at?"

(2) Another characteristic of a little child's memories is that, as a rule, they are not accurately localized in time and space as are probably most adult memories. As Compayre observes, "The picture is engraved on his memory, but the setting has vanished. He remembers distinctly the things he has seen, but he cannot tell where or when he saw them."¹ Compayre's statement, however, is not to be taken with absolute literalness, particularly as regards the spatial settings of the child's memories, unless he has in mind the child of less than a year. And it must be remembered also that the ideas of time and space are not equally difficult of acquirement: spatial relations are noted and remembered much earlier than time relations. The idea of time is clearly harder: it requires a wider sweep of imagination, a higher process of analysis and discrimination to master the ideas of "now," "to-morrow," "yesterday," "long ago," "next summer," than to understand "far" and "near," "on"

¹ *Op. cit.*, Vol. I, p. 219f.

and "under," "in front," "behind," "inside," "outside" and the like. The space relation seems to be given as part of the idea, while the idea of time seems more abstract, it is not given as part of the experience.

We have seen that in R.'s second year he recalled pretty definitely the space settings of a number of his memories; for example, where toys were left, where he saw a favorite playmate and so on. But his ideas of time continued to be of the haziest sort, although he had begun in the latter part of the third year to solve the mysteries of "now," "to-morrow," "yesterday," and the like. He learned that when one said in reply to one of his requests, "not now, after while" or "to-morrow," that the satisfaction of his desire was to be deferred for a time at least, and on these occasions the child would often protest with a "no, now, now." Past events, unless they were recent, were referred to an indefinite "jass summah" (last summer). Professor Sully cites the case of "a child of three and a half years, who had a very precise knowledge of the relative situations of the several localities visited in his walks (but) showed that he had no definite representations answering to such time divisions as 'this week,' 'last week,' and still tended to think of 'yesterday' as an undefined past."¹

So far as the author knows, no one has studied the development of the idea of time in an individual child, the manner in

¹ *Human Mind*, New York, 1892, I, p. 319.

which such words as "now," "to-morrow," "an hour," "last week," "next year" and so on acquire meanings. From my own incomplete observations, it seems probable that the first ideas of time are gained by a simple process of association. The child hears "now," "to-morrow," "last evening" in connection with experiences which touch him very closely. For example, he is told that he can have a certain toy or article of food "not now, but in the morning" or "to-morrow"; or he is reminded that certain interesting experiences occurred "last evening" or "yesterday." "In the morning" becomes associated first with the idea of night, of going to bed, or with the idea of having on a favorite piece of clothing; or again "yesterday" he was "at church" or "at the store." In some such way the time unit comes to be broken into a past, a present, and a future and these time-words come gradually to have meanings.

(3) Another difference between the memories of the baby and those of the adult is that the former are sense-excited; they arise in consciousness immediately and directly at the suggestion of a sense-stimulus, while most of the memories of the developed mind appear in connection with other memories, images are revived by other images. The same thought is expressed by saying that the baby's memories are peripherally excited while the adult's may be aroused centrally.

It may be said generally that during the first year the child's memory-images are revived by some sort of sense-impression. At any rate, this was true of R.'s first year. His memory-images were called up by sensory stimuli:

the name of an object was heard and the image of the object appeared in consciousness; a doll in the hand suggested squeezing it to hear it squeak, are examples. We have now to report the first instances in which images apparently were centrally aroused, in which they seemed to float into consciousness independently of sense-stimuli. As one might have expected, the first evidence of the presence of image of this sort was found in the expressions of desires for things not present to sense.¹ In the latter part of the fifteenth month (447th day), R. suddenly, and seemingly without any suggestion from outside, said, "baw," then began to look around for his favorite toy. Ten days later the idea "hat" seemed suddenly to pop into his mind and he began to cry, "ack, ack" (hat, hat). (Of course, one cannot be perfectly sure that in these instances the ball and the hat were not suggested by something the child saw or heard or touched which recalled the images of those articles. All one is sure of is that if they were thus suggested that what the stimulus was was not known to his companions.)

Another instance (eighteenth month) of what appeared to be a case of image in mind which had not been called up by a sense-impression was on the occasion of the

¹ With reference to this same point Mrs. Moore writes, "When the child could by the use of language show that he wished to have an object not present to sense we may conclude that he possessed a representation of the object complete enough to be associated as a central figure with feelings of pleasure."—*Op. cit.*, p. 91.

child's suddenly exclaiming "tschick" (chick), then starting toward the chicken yard which at the moment he could not see. I felt surer, however, about an observation made in the nineteenth month, as follows: the child was playing about the lawn and suddenly cried, "baw" and began to run about looking for the toy in great eagerness. But even in this case one may suggest the possibility of the idea of the ball being peripherally aroused. An unequivocal case of revival of idea by idea did not appear until the twenty-fifth month, as follows: R.'s grandfather had made us a visit, and while with us had played a great deal with R. Five days after the visit ended, I asked R., What did grandpa do? he first said "baw, baw," meaning that grandpa played ball with him which was correct; then "chai, chai" (chair) which reminded us that grandpa when playing with the child had set him in a chair and crossed one leg over the other — a new experience for R. — and one which pleased him greatly. My question had recalled some sort of a memory of his grandfather which at once revived the memory of playing with the ball. The idea "grandpa" also recalled that his grandfather set him on a chair and crossed his legs. Another instance of an idea appearing which was not revived directly by a sense-stimulus was noted early in the twenty-eighth month, as follows: In company with his mother the child had spent an hour at a neighbor's. While there he played with a child whom he

heard called " Margaret" by the members of the family. The next day the child came to me saying " Mägu, Mägu." At first I did not know what he meant, or was trying to say ; then I remembered the little neighbor's name and said, " Do you mean Margaret ?" which he answered — after his manner — by a grunt and smiles — in the affirmative. Another instance mentioned already in another connection was his recalling, as if out of the " clear blue," that he had seen pigs in a shed at a livestock exhibition. Other instances of seeming revival of memory images without the assistance of direct sense-stimuli are given on page 214f.

(4) Another notable difference between the baby's mind and the adult's, a difference very closely related to that just considered, is the absence in the former of what are called " trains of imagery." In the developed mind, most of the images which flow into consciousness are called there in the train of other images. An idea appears in consciousness, the first calls up a second, the second a third, the second and third may revive new ideas, and we have what we call a train of imagery, often uninterrupted by outside stimuli. For example, one glances up from his work and notes a spring shower which suggests returning leaves on the trees, blossoms, flowers, Easter-day, church, a certain minister, missionaries, a certain friend in South America. The train of ideas from the sight of the spring-shower to the South

American friend flows on independently of outside influences,—in the head, as we say. Trains of imagery are unknown, probably, to the child under two.¹ He hears the word “ball,” or “clock,” or “hat,” the idea of the object comes to his mind and there the process ends, unless the child happens to want the object named, while in the mature mind any one of these words is likely to start a train of images. “Ball” may suggest shape of the earth or a game of ball and these in turn may call up any one of a number of other ideas: so with the words “clock” and “hat.” The child’s memory images do not call up others for the reason that the “others” are not in the mind to be called up, or because the habit which ideas get of going in pairs or in series has not been formed. It was said in a preceding paragraph that the first instances of ideas calling up ideas occurred in the first part of R.’s third year, the instance, namely, of the idea “grandpa” calling up the ideas “playing ball” and “sitting with the legs crossed.” These instances give one an idea how trains of imagery start, and what they are like in the beginning.

(5) During the first year and a half—probably during the first two years—the baby lacks what in popular

¹ I infer from a remark in Mrs. Moore’s discussion of a point related to the one mentioned here that she would place the date of the first trains of imagery earlier than that given here. “Memory images,” she writes, “were not associated with one another independently of objective suggestion before the second year.”—*Op. cit.*, p. 91.

speech is known as the power of "voluntary recollection." He makes no conscious efforts to recall past experiences, such as the adult makes when trying to recall a name which for the moment is forgotten. In infancy and early childhood, recollections and recognitions of former experiences are accidental, apparently; that is, they occur without conscious effort on the child's part.

In considering this fact, the question arose, At what age do children begin to make an "effort to recall" past experiences? how early do they try to recall, for example, where they leave favorite toys, or names which are well-known, but which for the moment are forgotten? In seeking for an answer to this question, I first consulted kindergarten teachers and the parents of children three and four years of age. Both teachers and parents were certain that children three and a half make what I have referred to above as an effort to recall former experiences, where toys were left, or hidden (in kindergarten games), to recall names, and so on, and furnished an abundance of instances to support their belief. My attention then was turned to the child who has been the subject of most of the experiments and observations reported in these *Studies*. My observations were begun when the child was in his eighteenth month, and continued until there was unmistakable evidence that the child did make efforts to recall forgotten things; until "trying to remember" some forgotten thing came to be a frequent

occurrence. The first observed instance of "effort to recall" appeared in the early days of the twenty-eighth month, as follows: By referring to the chapter on FORM, (page 176f.), it will be seen that in the first week of the twenty-eighth month an effort was made to teach the child the names of a few geometrical figures cut from cardboard (circles, squares, and triangles — four sizes of each). The sizes were distinguished by the words, "big," "baby," and "buddah," being prefixed to his names for the figures which were "sūcoo" (circle), "kwēuh" or "pāi" (square), "annie" or "kwīājick" (triangle). For example, the largest sized circles were called, "big sucoo," and the smaller, "baby" or "buddah sucoo" and so on.

When the child was shown the figures and asked to name them, he had no difficulty in recalling the first part of the combination, that is the "baby" or "big," but the name of the figure frequently failed to appear. Then came the phenomenon which is referred to above as the effort to recall. When shown the card the child would say, "biguh" then a pause, then "biguh," then another pause — the expression of the face being either like that of an adult trying to recall a name, or a street number — only not so serious; or at other times, there were grimaces, stretching the corners of the mouth far apart, showing the teeth, or wide open in a vertical plane, shutting the eyes tightly and so forth. (See Fig. 2, Plate II.)

I did not keep a careful record of the matter, but I was of the opinion that the desired word rarely, if ever, came in response to the "grimace" search for it, and that as a rule it did appear when he stood perfectly still, not a muscle moving, with almost suspended breathing, and with the mouth slightly open. In the latter case, it seemed as if the child was waiting for the name to come, he knew that he knew it, and tried to recall it. From another point of view it was as if my question, "What is this?" as I held the card before him, coupled with the sight of the card made him conscious of a gap in the mental series which made him uneasy until it was filled. The visual image of the figure (circle, square or triangle) was one link of a broken chain, and the fact of the incompleteness of the chain caused a feeling of unrest or strain, held him stock-still until the circuit was completed, until all the links of the series were present, or — to use another figure — the image of the figure (square, triangle or circle) blocked the flow of consciousness as when one waits for the thunder-clap after seeing the lightning flash. If, in other cases, the lost link was not found at once, the tension gave way to grimaces, as already described. When the gap was filled, when the lost link was found great pleasure ensued as was shown by the explosive and exultant manner of uttering the name for which he had been seeking, and by the happy expression — often dancing with delight, chuckling and repeating

over and over the word, that is, when the terminus of the effort was reached.

The question, What in detail is the mechanism of recollection? plunges one at once into some of the most difficult problems in psychology. The child is confronted with a figure or color which he is expected to name at once. But the name, for the moment, is forgotten, and so is not forthcoming for three or four seconds or longer. The question is, What goes on in the mind during the interval between the perception of a given figure — say a square — coupled with the awareness that the name is expected, and the revival of the lost form name and its triumphant utterance? It is clear that the difficulty is due to a break between the visual image and the form name. And we say the difficulty is resolved when the gap between the image and the name is bridged over, when the path from the former to the latter is reopened. But this explanation is confessedly crude and problematic, wholly objective. We do not know what actually takes place either on the mental or neural side in passing from a state of not being able to recall a forgotten name and recalling it after an effort.

CHAPTER XI

IMAGINATION

IMAGINATION is a general name for the ability to picture changes in the contents and relations of the materials given in perception and memory, so as to form new images. Imagination, as distinguished from memory, is the process in which images flow freely, careless of their agreement or disagreement with a copy, or whether they correspond with any reality; while in memory actual past experiences are represented with more or less exactness.

Psychologists usually distinguish "active" from "passive" imagination. In passive imagination the images flow freely and without active attention or effort, as in day-dreaming, in castle building, in the fancies of childhood, or when one is following an easy description of a bit of natural scenery. Active imagination is present in the work of the artist — the poet, sculptor, or musician — in the conscious pursuit of his craft; in the "thinking" of the inventor, and of the designer of enterprises great and small. The person who consciously forms images of things and relations of things as yet unrealized exercises what is here referred to as "active" imagination.

Active, creative imagination as thus described is a rare phenomenon in infancy — if indeed it appears at all during the first two years. Many writers speak of the baby's "imagination," but the context usually shows that they mean passive, reproductive imagination, or the revival of images through association — in short, memory images. For example, Sully writes that the child C. in his tenth week "passed from the sight of his bottle to a fore-grasping or imagination of the blisses of prehension and deglutition. The child not only perceived what was actually present to the senses, but he pictured or represented what was absent," — an instance of revival through association. The same child in his eighteenth week turned his head so as to see some pictures at which he had been gazing, but had lost by having his position changed. Here we have an image to be sure, but Sully is careful to call it "a primary memory image" — a kind of memory after-image. When Compayre speaks of the recognition (in the twelfth month) of objects in a drawing or picture as the beginning of imagination, he no doubt means reproductive imagination or memory. Again the same author has reference to a memory image when he asks regarding the impatience the child shows to get out of doors when the nurse begins to make preparation for a walk: "is it not probable that he is excited by the vague image of former airings and the pleasure he has found in them?" So also Mrs. Moore regards the

first acts of imagination which she mentions as representations, as memory images. "In its (imagination's) most primitive form," she writes, ". . . chains of experience were reproduced in the order in which they had been met." To the same class of imaginations belong the images which R. formed of anticipated pleasure at the sight of his nursing bottle (fourth month). The sight of the bottle was associated with and revived, dimly perhaps, an image of the meal. Associations of this sort—between percepts, objective suggestions and images which they revived were formed with great rapidity from the beginning of R.'s fourth month. They are reported in the chapters on Association, Memory, and Language.

Beginnings of imagination. — We shall now inquire, what is the nature of the earliest imaginative processes, and when do they first appear? In a former paragraph it was said that the principal difference between memory and imagination is that the former is a representation of a real thing or event, while in imagination the contents and the relations of the material given in perception and memory are changed. If one holds strictly to this definition, while watching a baby's activities for evidence of the presence of imagination, one finds it impossible, at first, to disentangle memory processes from imaginative ones. One cannot at first draw sharp lines and say—here and now we have memory—there and then, imagination. Nor can one say, as

some writers believe, that memory must precede imagination, that the child must have a store of memory images before the imagination can "take flight," if by "store of memory-images" is meant a stock of definite, literal copies which might be inventoried as raw material which imagination may later transform.¹ The truth is rather that memory and imagination are inextricably bound together in all early imaging. Even in the simplest forms of perceiving, recognizing and the like one would hesitate to say how much is memory and how much imagination. With this disavowal of making any attempt to draw sharp lines between imagination and other simple cognitive processes we may now consider some of the infant's activities in which imagination is present.

The presence of imagination may be noted in five classes of infant activity, as follows: (1) in expressions of desire, (2) in devices in which the child shows initiative, in original plans to bring about given ends, (3) in imitative play, (4) in free, uncontrolled play, (5) assimilative imagination, in those cases in which percepts are overlaid and transformed by more vivid images which the percept calls up.

¹Such a conception brings home to one how largely our thinking is dominated by the "faculty" psychology, and also how poorly adapted and clumsy is the terminology of an adult, functional psychology, the psychology of the developed mind, for purposes of describing primitive, developmental processes.

The manner in which the imaginative process appears in these classes of activity will be illustrated briefly. First, expressions of desire involving imagination. The first desires probably are for the repetition of pleasurable experiences which the child recalls. But there comes a time—early in the second year, as a rule—when he begins to picture *new* relations which he wishes realized. For example, in his eighteenth month R. would pat on the floor with his hand and cry “dee” when he wanted an article placed on the floor in a certain place where he could get hold of it. The same method was employed to express his desire to have a person sit on the floor and play with him; *i. e.*, he would pull at one’s clothing, then pat on the floor to indicate the place where he wanted one to sit. In these simple expressions there is something more than memory: *e. g.*, the child imagined the position of the toys changed from the shelf out of his reach to a particular place on the floor (or on a chair) where he could reach them. Again, one evening in the twentieth month the child gazed at the moon for a moment then began to reach for it crying “moom”; then he took my hand and lifted it, toward the luminary meaning that he wanted me to get it for him. In this instance, the transformation was slight, to be sure, for he had frequently had things which he wanted, but could not reach, handed to him. Still, it was not merely a reproductive process: it was the

first time that he had tried to have one get that particular object — the moon — for him. One also sees the work of imagination in the homely instance of R.'s trying to get a kitten to climb upon a particular chair which he expressed by looking into the animal's face and saying, "chai, chai," at the same time patting the chair upon which he wished the kitten to climb (twenty-fourth month). And again, same month, a simple form of imagination was present when the child cried "fouh, fouh," meaning that he wanted a top spun on the floor rather than on a table. In the thirty-first month, the child frequently imagined huge Os which he wanted me to draw for him, expressing his desire for the big O by stretching his arms far apart and above his head. When R. was told (thirty-fifth month) that his grandfather was coming to see him and would bring a "choo-choo," the child at once extended the list of things which he wanted his grandsire to bring, saying, "choo-choo, baw (ball), sed (sled), hoss (horse) — Gapa bing all ese sins," meaning that he wanted grandpa to bring all the things named. Here we say the child imagined a list of things which he wanted; also that his grandfather would bring them.

Imagination in practical inventions. — The presence of imagination is seen in the child's practical devices to gain given ends. Early in his fifteenth month, I saw the child J. push a child's chair to a table, then climb

up in the chair in order to reach spoons, cups and other table-ware. This action, while probably an imitative one, was not wholly an affair of memory. Imagination was a factor. The child doubtless had a lively imagination of the pleasure of being engaged with the interesting table-ware when he started to the table with the chair. A little later, one may observe entirely original devices in which the child shows initiative, in which he acts out a new image. For example, during a rain-storm, in R.'s nineteenth month, he went about the room closing the inside window shutters to keep out the rain, as he supposed. In the same child's twenty-first month, I observed a device which, for a baby, showed considerable ingenuity. The child was playing in the street, drawing his wagon after him. When some member of the family, fearing that the child would get hurt, called to him to come off the street, he climbed to the sidewalk and tried to pull his wagon after him, but could not. Finding that he could not get the wagon over the curbstone he climbed down to the street, lifted the wagon and set it on the side-walk, then climbed up himself, picked up the wagon-tongue and toddled toward the house as he had been requested.

One evening in R.'s twenty-fifth month, in his efforts to get a kitten to eat a piece of toast which was lying on the table, he employed the unusual device of lifting the kitten to the table, and then rubbed its nose over the

toast instead of taking the bread and giving it to his pet as an older child would have done. . . . Other simple devices which were noticed frequently were pulling chairs and other light articles of furniture away in order to get toys which had rolled, or fallen behind them out of his reach.

In his thirtieth month, R. conceived the idea of driving miniature bargains with his infant brother when the latter had articles which R. wanted. The method was to get a ball, tin box or other toy and offer it to the baby with sugared words in order to get the baby to let go — say a wagon — which R. wanted. This device which, as was stated, was first noticed in the thirtieth month was seen frequently in the remaining months of the third year, and, indeed, well into the fourth when owing to parental interference the imposition was discontinued. Another device which R. used to keep his baby brother from getting his favorite toys was to push a chair in front of the baby when he was crawling toward one of R.'s toys, saying, "no buddah git it," *i.e.*, I do not want brother to get the toy.¹

¹ These apparently flagrant cases of selfishness were not really such, I think. Or if they were selfish they were certainly wholly unintentional. In the first instance, his conduct — trying to get the toys from the baby — was the result of suggestion. The baby having the toy suggested to R. his having it and doing with it what the baby was doing: it was a form of imitation. In the second instance, the baby having toys belonging to R. was to R. a disturbance of the customary order of things, and that was all: and we have had numerous illustrations of the general principle that

Imitative play.—How much of the baby's imitative play is an effort literally to copy his models, how much is free realization of an idea which has been suggested by the models? One cannot say definitely; but one is safe in saying that few children at play are such slavish copiers as not to transform, in some measure, the things they imitate. We shall see hereafter (Ch. XII), that R.'s play began to be noticeably imitative in the seventeenth month, *e. g.*, dusting furniture and "reading." But the first clear instance of the transforming power of the child's imagination in play is found in the record for the twenty-fifth month, as follows: On the second day of the month, I gave him a rag-doll made by tying a knot in one corner of a handkerchief which he laid in a baby-crib, and then began to beg for a bottle so he could feed the doll. This was a clear instance of the working of the imitative play impulse, the impulse to act out, to realize an idea in outward form.

The idea of the doll being a baby suggested the ministrations, which R. had often observed, of others caring for his baby brother. But the doll-play is so much a matter of lively fancy, the child moves in a world which is so distinctly fanciful in character that he fails to note what

a disturbance of the habitual arrangements always causes a shock to the child. This interpretation of R.'s conduct in these cases seemed not too charitable when I noticed that he was entirely willing for the baby to have the toys which belonged to him beyond all question.

the observer regards as the incongruities of the scene. He doesn't ask whether the doll does or does not eat the toast or take the medicine — that's no concern of his: he fancies that it does and that is the essence of the affair.

The doll interest continued for a little more than two weeks during R.'s twenty-fifth month. During this period, the child reproduced in doll-play most of the ministrations for his infant brother: feeding the doll toast, spreading blankets over it when it took its noon-day nap, giving it imaginary medicine from a real medicine bottle, tying scarfs around its neck when getting it ready for an outing, and so on. The interest in the doll-play in that particular way disappeared as suddenly as it appeared, and did not return for a period of six weeks, when it ran another course similar to the one already described.¹

Constructive imagination in free, uncontrolled play. — Every observer of children knows how in their play they represent all sorts of objects and scenes by means of simple articles like blocks, pebbles, buttons, sticks, and how readily the child mind transforms such articles into things of life and action — horses, houses, soldiers, locomotives — and how they are marshaled to represent scenes which have greatly impressed the child and which he wishes to repeat. For instance, the child goes to church

¹ Professor Baldwin, *Mental Development*, p. 362., gives a charming picture of an imitative play in which his children took the parts of "mamma" and "baby."

and upon his return home, plays "church," using chairs, tables, blocks — whatever comes to hand to represent the features of the church which impressed themselves upon him. In like manner, school, keeping store, a circus parade, are reproduced in their most striking features by means of such articles as the child can command. The blocks or chairs or shells form the one bit of necessary substantiality from which the child fancy takes its flight, and around which it builds its imaginary scenes. Professor Sully quotes from "a German writer" a true to life picture :

"There sits a little charming master of three years before his small table busied for a whole hour in a fanciful game with shells. He has three so-called snake-heads in his domain ; a large one and two smaller ones : this means two calves and a cow. In a tiny tin dish the little farmer has put all kinds of petals, that is the fodder for his numerous and fine cattle. . . . When the play has lasted a time the fodder-dish transforms itself into a heavy wagon with hay : the little shells now become little horses, and are put to the shafts to pull the terrible load."¹

Children differ greatly with respect to the things which appeal to their play impulse, the difference depending somewhat upon the make-up of the child's surroundings and the suggestions therefrom, and often upon suggestions which come from sources unknown. One child

¹ *Studies of Childhood*, p. 42.

looks upon the postman and his occupation as fit for admiration and imitation; another, the street-car conductor and the punching of tickets; another, cows and horses; and another finds the railway locomotive the most wonderful thing in all the world. Sometimes in their play they represent the object; at other times, what the object or person does is most impressive and that is reproduced.

Most of R.'s play of this sort was limited to the narrow field of making "choo-choos," and houses, and in none of his imaginative play did he show an unusual liveliness of imagination or ingenuity in realizing his ideas. Early in the thirtieth month, the child became engrossed with making "choo-choos" by arranging blocks in a straight row. Later he used bricks, shells, broken pieces of tile in the same way. In the twenty-ninth month the child was observed on two or three occasions rolling a sheet of paper which he then held to his ear and played he was telephoning to the stable to have the family horse sent to the house. This was in imitation of telephoning, which he saw almost daily during the month named. On a few occasions, in the latter part of the third year, the child showed some interest in building houses of blocks. But his plans never rose beyond a one-room house having one door. Sometimes, after completing the house, imaginary birds and "wow-wows" in the form of buttons, nails or pencils were given shelter in the house "to keep

them from getting cold." But house-making and peopling had not at the end of the third year become half so interesting as choo-choo making. (See Fig. 5, Plate IV.)

Assimilative imagination. — We have instances of assimilative imagination when two images — perceptual and memory — containing common factors fuse and form a new image, when what is present to the senses is transformed by fancy. For example, R. looking at columns of coal-smoke rolling out of the chimney of a near-by house, cried "choo-choo" (twenty-sixth month). The column of smoke reminded him of the smoke of a locomotive; what was present to the sense — the column of smoke — was transformed in some measure, perhaps, by his image of a locomotive. Another instance was when he took hold of the straps of a trunk and shook them and clucked as if driving a horse (twentieth month). In this instance the straps rang up the image of the lines which he was allowed to hold when driving with other members of the family, and also the whole interesting experience of driving which he repeated with great energy.





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PLATE IV.—1. SHOWING R.'S MANNER OF THROWING—SECOND YEAR. 2. CRYING WHEN NOT ALLOWED TO HAVE A FAVORITE TOY. 3. ADMIRING A BALL, THE FAVORITE PLAYTHING OF THE SECOND YEAR. 4. A FAVORITE PLAY OF THE LATTER PART OF THE SECOND YEAR. 5 MAKING A TRAIN BY PLACING PIECES OF BRICKS IN A ROW—THIRD YEAR.

CHAPTER XII

PLAY

THE word "play" is used here to include all forms of activity performed solely for the pleasure the activity yields. The earliest play of the infant seems to arise out of a hunger for sensations of touch, sight, hearing, and perhaps muscular sensations, and consists of handling, pulling, "feeling," turning over and over, shaking and gazing at whatever the child can lay hands on. To the onlooker, all this gazing, pulling, feeling, shaking, seems like a feast for the baby's eyes, hands, and ears. This may be called the stage of *sensuous play*, the activity having its full justification in the sensuous delight the baby gets out of it. For example, it was noticed early in R.'s *third month* that he enjoyed gazing and fumbling at colored yarn balls suspended so that they touched his hands whenever he flourished them freely. A few days later, he was absorbed in pulling and looking at his fingers. In the latter part of the same month, he began to punch and fumble at — apparently tried to get hold of — attractive articles which were held over him and allowed to touch his fingers, as when one dangled a watch by the chain so that it occasionally touched his fingers. The

touch seemed to awaken the desire to get hold of and "feel."

RECORD OF THE PRINCIPAL FORMS OF R.'S PLAY ACTIVITY
DURING HIS FIRST THREE YEARS

Fourth month.—During this month, in connection with the growing impulse to reach and grasp, came increased pleasure in handling toys, blocks, spools, tassels, — whatever came within reach. In the early part of the month, the child showed displeasure by fretting when a watch and yarn tassels which he had been examining were taken away. In the last week of the month he took pleasure in tearing and crumpling a newspaper, and was distinctly displeased when one with which he was occupied was taken away. Probably the ear was beginning to come in for its share of the pleasure in the engaging exercise of paper-tearing.

Fifth month.—During the fifth month the child continued to enjoy handling, shaking, examining, turning over and over toys and playthings, and his resentment when they were taken from him grew more pronounced.

Sixth month.—The sixth month showed no noticeable change in the child's play activities, except that, like all his bodily movements, they became more vigorous and more varied. Rolling, kicking, tumbling about on the floor, pulling at whatever he could reach, took up a good share of his time.

Eighth month.—Activities like shaking and tossing paper, shaking a small breakfast bell as if to make a noise, were first noticed in this month. These activities showed a marked advance over the simple "feeling," handling, looking at articles of the earlier months. Then, the interest centred in the thing, its "look," and "feel"; now, in what he can do with it, the sensations it will yield under manipulation.

Ninth month.—The craving for things to handle and examine was unabated; but the child was becoming more interested in what he could *do* with things. For example, shaking and threshing newspapers and strings of bells to make a noise, throwing toys out of his crib when tired of them, or possibly to hear them fall.

Tenth month.—In this month, the play activities began to be influenced by the dawning imitative impulse; that is, some of his play consisted of trying to do what he saw others doing. Handling, throwing, shaking whatever he could lay hands on continued, as did throwing playthings aside when tired of them.

Eleventh month.—The only distinctly new forms of play noted in this month were—(a) squeezing a rubber doll with a whistle attachment, perhaps, to make it whistle or squeak; (b) playing by the hour with a cast-off black Derby hat, putting it on his head, taking it off, throwing it on the floor, crushing in the crown, etc.

Twelfth month.—Examining, pulling at, "talking" in

a lively manner to toys, throwing things on the floor, holding a watch to his ear to hear the tick, pulling himself up to chairs, walking about the room by holding to furniture were the principal play occupations of the twelfth month.

Thirteenth month. — In the first month of his second year, the child began to take pleasure in throwing and rolling a rubber ball about the room. It was evidence of delight in moving things, and very likely too he got pleasure out of the feeling of his own power to throw and roll the ball. The ball soon came to rank as his favorite plaything, a position which it held, with few interruptions, until the middle of the third year. (See Figs. 1, 2, 3, Plate IV, illustrating R.'s interest in balls during nineteenth and twentieth months.)

Fourteenth month. — In this month the incipient constructive impulse, the desire to make things, to change their relative positions began to influence the character of R.'s play. For example, piling blocks and standing thread spools on top of one another began to interest him. In this month, also, the desire for companionship, or help, in his play was first noticed. Before this time, he had been content to pursue his various plays alone. He did not feel the need of, did not ask for companions, and played entirely indifferent to what others were doing. He wished to do all the handling, feeling, looking himself, and was likely to become impatient if he was inter-

ferred with in any way. "Now," one note reads, "he wishes others to join him and help him carry out his plans. But even now the main interest is the egoistic one of watching another person do something which he likes to see done, but cannot do himself. He enjoys watching performances which are too hard for him. For example, the child very often begged us to play ball with him, *i.e.*, to roll and toss the ball, his part being to catch it when it was rolled to him, and to go after it when it got away from us."

Fifteenth month.—Balls were easily the favorite play-things of this month. The child would play with them, throwing and rolling them, crawling after them by the hour. Piling up cards, spools, blocks, rocking toys in a chair were other play activities. . . . The child's first opportunity to be or play with another child near his own age came in the fifteenth month. At first his manner toward his baby visitor was decidedly friendly and also decidedly awkward. First putting his hand on the child's hand, then pulling at his dress, "feeling" his arm, and acting toward his playmate much as he would have toward a big doll. This manner of playing with other little children—taking hold of them, pulling at their hands and arms—friendly as it certainly was, seemed somewhat rude, and timid children shrank from it. Not until the third year did R.'s manner toward children become milder and more companionable.

Sixteenth month.—The child's interest in men's hats overshadowed every other interest in this month; indeed, became almost a mania. He wanted every hat he saw, no matter where or to whom it belonged. When given a hat he would busy himself by the hour crushing in the crown and straightening it out by putting the hat on his head and pulling down. His other plays and interests were not different from those of the preceding month.

Seventeenth month.—Play in this month grew more imitative in character. Washing and dusting the floor, dusting furniture, "reading" are examples. Running about the lawn, ball in hand, begging some one to play with him, looking at pictures, pulling flowers and smelling them, are typical of other play activities observed during this month.

Eighteenth month.—Imitative play was prominent; e.g., scrubbing chairs with a brush, sweeping the stone walks and the floor, pulling grass and scattering it about as he saw others doing. The child frequently begged others to join him in his play, and was delighted when he could get some member of the family to join him, particularly in rolling a ball and in piling blocks.

Nineteenth month.—Throwing and running after balls, marking on paper with pencil, trying to get a key in a key-hole, pulling grass and scattering it about the lawn, climbing up the side of a grape-arbor to get green grapes

(baws) were representative play activities of the nineteenth month.

Twentieth month.—Throwing balls, blocks, apples; piling blocks on top of one another; turning through magazines and picture-books; piling balls and apples in a little wagon and running about with it; digging in a sand-pile; making piles of sticks, were the principal plays of the twentieth month. The child's efforts to play with a little girl M.—who was a few months older than he but no larger—showed the same unmistakable signs of friendliness and the same awkwardness mentioned in the notes on the play of the fifteenth month. He was at a loss to know what to do when told to go play with M. He took hold of her hands and arms, looked at her, tried to speak her name all to no purpose. She would have none of it, and flatly refused to stay with him, so rude was his manner. It is probable, one note suggests, that the average child, if an "only child," has to learn to be companionable.

Twenty-first and twenty-second months.—Balls were his favorite playthings in these months, with a little wagon as a close second. (See Fig. 4, Plate IV.)

Twenty-third month.—The child did not seem so fond of throwing and running after balls as in previous months. Interest seemed—so the notes indicate—to centre in getting in his hands every new thing he saw. This is accounted for, in part, by the fact that he was in a new

environment, the things around him were new, and he wished to examine them.

Twenty-fourth month. — The ball had strong rivals in a toy drum, a wagon, a rag-doll, picture books, probably because of the novelty of these last named articles.

Twenty-fifth month. — The following ten minutes observation of the child's activities gives one a good idea of his play in this month. First he brought a ball asking that it be tossed "up high"; then he wanted the ball bounced on the "fouh" (floor); then a little wagon is dragged around the room and swung to and fro; then two balls are put on the wooden base supporting a toy horse and are wheeled about the room; then he gets a broom and sweeps; then picks up and throws a ball; next begs for a powder box; "feels" the baby's head; begs for pencil, saying "O bob," meaning that he wants to mark on paper. . . . On a certain day near the middle of the month, the child was busy during the greater part of the afternoon with soap and rag washing the floor, chairs, table and other furniture.

Twenty-sixth month. — The favorite playthings, in the order of preference, were: balls and empty paper boxes which were thrown and carried about the house; pictures which were looked at, carried about the room, and "talked" to.

Twenty-eighth month. — The child was very fond of a toy horse mounted on a wooden frame and wheels so it

could be drawn. He also spent a good deal of time during this month in turning through books and magazines, looking at the pictures, talking to and about them.

Twenty-ninth month.—Was fond of balls, but played with almost everything. “Picks up, throws, carries almost everything he can handle,” as one note reads.

Thirty-first month.—The favorite playthings were—a wagon, balls, whips, named in the order of preference. . . . One of his neighbor friends, for his amusement, tied two ropes to a post so he could sit on a chair and play he was driving. The play engrossed his attention for a short time—one day—then was given up and never resumed though the ropes were played with in other ways. . . . A number of observations were made in this month in order to answer the question, how do children of this age play when two or three of them are together? what do they do? It was found that they would sit or stand beside one another by the half hour, talking or parleying about and handling playthings. Walking about the lawn, putting toys in a wagon and drawing it, were other forms of play.

Thirty-second month.—The desire to be with children near his own age reached high tide during this month, and his chief delight was in being with K., his playmate, a near neighbor's child. As soon as he was awake or meals were over he wished to be with her, saying, “see K. now,” “go K.'s house now,” “K. come Wadu's house,”

and so on. In order to be with her he would run away every chance he got, unmindful of pretty sharp punishment for it. Their favorite play when together was running about with little wagons over the lawn and up and down side-walks. Sometimes K., his playmate, was in the wagon, sometimes a pair of headless and armless dolls, sometimes the wagon was empty. . . . Making "choo-choo" (train of cars) with blocks was another of the child's plays which furnished him much entertainment during this month.

Thirty-third month. — The leading occupation in this month continued to be running about with the little wagon. Sometimes the wagon was empty, sometimes rag-dolls were in it, sometimes K. or R.'s infant brother. On the first day of the month, I observed the child as he was engaged in the imitative play of putting a doll to sleep, the whole performance being a rough copy — yet true as to the number of details — of his mother's putting his infant brother to bed. (Doll play is described more fully under *Imitation*, page 136f.)

Thirty fourth month. — Two new forms of play were noted in this month. One consisted of pretending he was a "choo-choo in uh depot," as he crawled under tables. This play was suggested by a recent trip to a railway station. Another play was house-building with children's blocks. The house was a one room structure, and having only one door.

Thirty-fifth month.—The house building with the blocks continued as in the preceding month. Making "choo-choos" by arranging blocks in rows also occupied him a good deal. (See Fig. 5, Plate IV.) The child also spent a great deal of time in looking at pictures in books, magazines, catalogues and the like. Other plays were paper-cutting and throwing pebbles.

Thirty-sixth month.—The three play activities which were most prominent in this month were: making houses of blocks and placing in them pencils, pen-knives, keys and the like so they would not "take cole," as the child expressed it; looking through magazines, books and papers and examining, naming, and talking to pictures he found in them; playing with balls — throwing, tossing, bouncing, kicking them. The child was busy the greater part of two days in the latter part of the month writing letters to "Sa-Kauf" (Santa Claus) which usually read, "bing Wa (R.) choo-choo, bing Wa dollie, bing Wa hippo," and so on.

CHAPTER XIII

PICTURES

IT is no more to be wondered at that a baby a few months old should be interested in pictures than that he should be interested in rattles, tassels, tin boxes, dolls, and the like. Pictures are things of varying light and color, and that is enough, at first, to make them pleasing to the baby. At first, then, the little child's attitude toward pictures is not to be thought of as different in kind from his attitude toward dozens of other things which he sees around him. A *second stage* in the child's manner of regarding pictures is reached when he calls them by the same name or acts toward them as he does toward the objects which they represent; when, for example, he acts toward the photograph of a baby as he does toward a real baby, or toward a picture of a kitten as he does toward the house-pet. Often before the end of the first year children "recognize" pictures; that is, see the similarity between pictures and familiar objects, *e. g.*, persons, animal pets, toys, playthings and the like. Thus, Miss Shinn relates that her niece (293d day) became excited over a picture of a cat, "crying out as she did at the sight of real cats," and thereafter seemed to recognize a picture of a cat "judging by the similarity of

demonstration toward it and real cats." On the 327th day, the same child "turned over the leaves of a picture book and found a picture of a cat's head, full front, and put her finger on it with a cry." In the twelfth month, my child J. had the curious trick of putting his finger in one's eye with a cry of delight. The eye seemed to be a thing which particularly interested him. In making a series of tests of his ability to recognize pictures, it was found that he acted in the same manner when given a picture of a human face; *i. e.*, he would lean over and put his finger on the eye with a cry of pleasure, which seemed to indicate that he saw the resemblance between a real eye and the eye as represented in the picture.

A stage higher than those just mentioned is reached when the child calls a picture by the same name as he does the real object, but at the same time acts differently toward the two. The picture and the object are classed under the same name; yet it is clear that the child knows them as different. A striking illustration of this stage appeared in the study of R.'s fears of animals (see pp. 100, 102). Thus, it was found, during the twentieth month, that while the child was very much afraid of real cats ("tăts"), and would scamper away when they came near him, yet he showed not the slightest fear of pictures of cats — which he also called "tăts"; indeed, that he enjoyed holding and looking at them.

It is not to be understood, I think, that difference in actions toward pictures and the objects which they represent means that the child, at first, grasps the meaning or purport of the picture ; that is, understands that it is a representation. Probably the difference in behavior means no more than that the child regards the pictures of the cats, dogs, locomotives and so on as *different* cats, dogs, and so forth. The understanding of pictures as representations is one of slow growth and not fully developed until language comes to the aid of the teacher, who is then able to show the child the difference between "real" objects and their representations.

Although, as we have just seen, children come very early to recognize, in a way, the difference between pictures and real things, and to act differently toward the two, the difference to the child is not a hard and fast one ; and it is often found that children react to pictures not as pictures, but as real objects or situations. Many pictures are as "real" to the child as are real objects, just as a vivid piece of stage acting, to many grown persons, is as impressive and "real" as if it were a scene from real life, and not merely acting. Miss Shinn gives two pretty illustrations of this in the instances of her niece's sympathy being stirred by pictures — once by "a picture of a lamb caught in briars which the child tried to free by lifting a branch which lay across him in the picture" ; again, in the last week of her thirty-fifth month, "looking at a picture of a chamois defending her little one from an eagle, (she) asked anxiously if the mamma would drive

the eagle away, and presently, quite simply and unconsciously, placed her little hand edgewise on the picture, so as to make a fence between the eagle and the chamois."¹ On a given day in the early part of R.'s twenty-seventh month, while making a study of his manner of holding a pair of scissors, I gave him a pair of scissors, and a newspaper to cut. As he was cutting at random across the paper he suddenly stopped, and cried, "hut man, hut man," *i. e.*, hurt the man — when he carelessly cut into the picture of a man. For a moment or two the child was much disturbed by the notion that he had hurt the man.²

It is a matter of interest to determine what pictures individual children recognize first; that is, whether of persons, of animals, or of toys and playthings. Miss Shinn was of the opinion that the first picture recognized by her niece was that of a kitten; that is, it was the first picture which called forth the same conduct on the child's part as the presence of the real object. I gather from Mrs. Moore's statement that her child "was interested in pictures of persons for months before he cared for illustrations of other things," that the child "recognized" the pictures of persons before those of other things; although,

¹ *Notes on the Development of a Child*, p. 104.

² One point found in all of these three cases is curious enough to remark, namely, the idea of physical harm called forth expressions of sympathy on the part of the children.

of course, the child's neglect of "other things" may have been due to his strong preference for the human pictures. My own study did not include careful attention to this point, but I am of the opinion that both R. and J. recognized photographs of persons, *i. e.*, saw resemblance between the photograph and the human face, before they recognized pictures of other objects. This is as one would expect. The human face being seen very often, and, presumably, very interesting to the baby, would be better impressed on his mind, and so would have greater reviving power than less interesting images which occur less frequently. But it should be said, the question of the earliest recognitions of pictures is not a matter easily observed or investigated, since so much depends upon the nature of the pictures used, the previous experience of the child, what things he has seen oftenest, the interest which the experimenter may throw about the investigation, the mood of the child, and the like.

A number of observers have remarked that children are indifferent to the positions of the pictures they are handling or examining, that they do not mind whether a picture is right way up or wrong. Sully quotes from a friend, a psychologist, "that his little girl aged three and a half, 'does not mind whether she looks at a picture the right way up or the wrong; she points out what you ask for, eyes, feet, hands, tail, and so forth about equally well whichever way up the picture is, and never asks to have

it put right that she may see it better.''¹ Mrs. Moore reports concerning her child that when handling pictures: "Naturally he got them inverted. The reversal never seemed to trouble him in the least, and until the ninety-third week, he continued to look at them either way with evident enjoyment."²

My observations with reference to R.'s regard for the position of pictures began near the middle of his seventeenth month. At that time and ever afterward, the child insisted on having pictures — photographs and other pictures — *right* side up. On a number of days during the seventeenth and eighteenth months, I handed him pictures reversed, and he invariably set them right as soon as he got hold of them. On one occasion (nineteenth month) I arranged a row of photographs, wrong way up, on the shelf of a bookcase. Presently the child found them and proceeded to reverse them. On another occasion (twentieth month) I gave him a collection of eight photographs — men, women and children — and asked him to place them on the shelf of a bookcase. This he did, one at a time, taking care to get the right side up. Then I asked his mother to call the child to another room for a few moments while I inverted four of the pictures. When the child returned, he noticed the change at once and proceeded to right them. A similar regard for the correct position of pictures of animals, houses, wagons, figures on blocks — whatever he found in the way of representation — was frequently noticed in the remaining months of the second and third years. Usually, he was able to recognize pictures when they were inverted or when they were held in other

¹ *Studies of Childhood*, p. 310.

² *Op. cit.*, p. 60.

than an upright position, but when he got hold of an inverted picture his first work was to get it upright. The child J., on the other hand, was entirely indifferent as to the positions of pictures, and did not, prior to the thirtieth month, make any effort to right pictures which were handed to him in an inverted position, or when freely handling them as he found them in his play with picture-books, cards, blocks and the like. I have no satisfactory explanation of the rather exceptional regard which R. had for the proper position of pictures. A simple explanation would be to say that the child got very accurate and very vivid images of the positions and relations of the parts of real objects, and was not satisfied until the representation agreed with the copy. It was a kind of precocity the natural history of which one could not determine without especial care and study.

Children often develop very strong, but, as a rule, transient preferences for pictures of different kinds—much as they do for toys and playthings. At first, a child, as in the case of Mrs. Moore's boy, will pass by all pictures except those of people. A year later, a picture of a cat may be the same child's favorite; and still later, a picture of a large monkey wearing a gown, glasses and a cap affords greatest delight. Miss Shinn says that her niece's interest in pictures (middle of nineteenth month), "narrowed to an almost exclusive desire for pictures of *birds*, which was for some days a passion; and for weeks to 'see birdy in book' was a frequent appeal." My own record contains many statements like that just quoted from Miss Shinn. At first, pictures of human beings, es-

pecially babies and children, were R.'s favorites. Later, pictures of animals — cats, dogs, cows, elephants, an elk with great horns — pictures of locomotives, and certain Mother Goose pictures — the cow jumping over the moon was one — each had their weeks or months when they were frequently called for, pored over, and "talked" to with great pleasure by the half hour.

One who had not attended to the matter would say off-hand, very likely, that children would prefer colored pictures to uncolored ones. Observation shows, however, that, generally speaking, children under two and a half or three show no decided preference either way. At first, the child is interested in pictures merely as objects; then later, in the observed similarity between pictures and objects — persons, animals, machines — which they represent, and not in the color. Color is subordinate in point of interest to the image which the picture furnishes. Miss Shinn writes on this point, "We were never able to see that there was any distinct preference for colored pictures over uncolored, and those first recognized were very much in outline." Mrs. Moore says her boy "never evinced the least preference for colored over uncolored pictures." My notes on this question are in agreement with those just quoted; in fact, we thought, on a number of occasions, that uncolored pictures were preferred to colored ones; but we did not follow the matter carefully enough to say positively that such was the case. All

that we found was that colored pictures frequently were laid aside for uncolored ones ; but it might have been because the objects represented in the uncolored pictures were more interesting at the time than those portrayed in the colored ones.

Observations and experiments.—In addition to the observations recorded in the preceding paragraphs, I made a number of experiments bearing upon the question of R.'s manner of recognizing, or apperceiving, and naming pictures of familiar objects ; also of pictures having some resemblance to objects which the child knew fairly well. In order to carry on the tests along this line, I collected more than one hundred different pictures from the advertising pages of magazines, circus bills, and newspapers. The pictures were kept in a heap, unclassified, and were frequently shown to the child beginning with the first week of his twentieth month and at intervals until the end of his third year. Very often the child came to my study and asked to see the "pichees" ; at other times, he went through the heap, or part of it, by request — as an older child might go through his lesson in naming words.

In the remaining paragraphs of this chapter, a number of the pictures have been classified and the names the child gave to the pictures are arranged by weeks in tables. The first group may be called the "animal" group. (The figures which are set after the names of the animals give

roughly, in inches, the dimensions of the picture. . . . The * indicates the point at which the true name of the object represented by the picture was given to the child.)

Naming pictures of animals.—

Week.	Tiger 3x6.	Bear 3x6.	Lion's Head 10x12.	Rhinoceros 4x7.
85th	mum ¹	wow-wow and mum wow-wow	tat (cat) tat and kak	mum
86th	wow-wow, hip (dog)			"
87th	"	"	"	"
88th			"	"
89th	mum	"	"	"
99th		"		
100th			no answer	
103d	wow-wow		tittie (kittie)	
116th	"	apootos (elephant)	tidie	apootot (elephant)
122d		wow-wow		
123d	"			
127th	"	"		
133d	no answer	{ no answer "papa tell iss" *		cow no answer
139th	kiddie			
147th	"	peah (bear)	kiddie	
156th	wow-wow	beah	kittie	hippo

Week.	Giraffe 7x10.	Elephant. 3x5	Cow 1x2.	Donkey 3x4.
85th	mum			mum
86th	" *	mum *		"
87th	" wiaff (giraffe)	mum, wiaff (giraffe) and eaff (elephant)	mum	
89th	waff-wi	waff-wi	"	Dat (horse)
99th	mum	weehee	"	"
100th	wihee (giraffe)			

¹ "Mum" at that time was the child's name for all four-legged animals, except dogs and cats.

Week.	Giraffe 7x10.	Elephant. 3x5	Cow 1x2.	Donkey 3x4.
103d	Wasees, or Wahees (giraffe)			
116th	Dat, Ephah	Apooto (elephant)		
122d	Efuff (elephant)	Efu		
126th	"	Efuff	Cow	
133d		"		
147th		Ephut	"	
156th	Do't know	"	"	Hoss

Week.	Kitten 2x2.	Rat 1 1-2x2 1-2.	Rabbit 2x4.	Raccoon 2x4.
83d	Ka (kittie)	Ka (kittie)	mum	mum
89th	tat	wow-wow	wow-wow	wow-wow
99th			or mum	"
100th	titee	no answer	wow-wow	"
103d	ti-tie	wow-wow	"	"
116th		no answer	"	"
122d	Li kittie		"	"
127th			no answer *	kiddie, nuna
139th			wabbit	wabbit
147th			"	Beah (Bear)
156th	Kit		"	Do't know

Week.	Hen 1 1-2x2.	Chick just out of shell 1x1 1-2.	Owl 1x1 1-2.	Parrot 1x2.
83d		ti-tit (chicken)		ba-bee
86th	tic-ti			"
89th	"	ti-tit		bu, but, bid (bird)
99th	"ti-tie" and "bid" (bird)	ti-ti		bid
100th		bid		
103d		ti-tie		
116th		bid		
123d	biddie, chick	chic-chic		
126th		chickie	kiddie	
139th	chigie	chicken	"	
146th	chicken	bud	" Kit " and " budie "	
156th	"		bud	

Drawings of the human face.—Beginning with R.'s eighty-sixth week, and continuing at intervals until the close of his third year, a series of tests was made to determine what feature or features were necessary in order to get the child to perceive a drawing as that of the human face. For example, would a drawing which represented only the nose and eyes suggest the human face? The same problem, put negatively, was — how many of the features of the human face may be omitted from a drawing and still leave the figure suggestive to the child of the human face? Or, still further, the question was, what, to the child, are the marks of recognition of drawings of the human face? Is it some one facial feature — the nose, ears, eyes, the outline of the head, the beard — or some of these in combination which suggest "man" to the child?

In these tests, sixteen drawings in all were used. The method of experimenting was to show the child the drawing, at the same time asking, What is this? his answer or remarks, if any, being written down at once. (The drawings which were used are reproduced on page 262.)

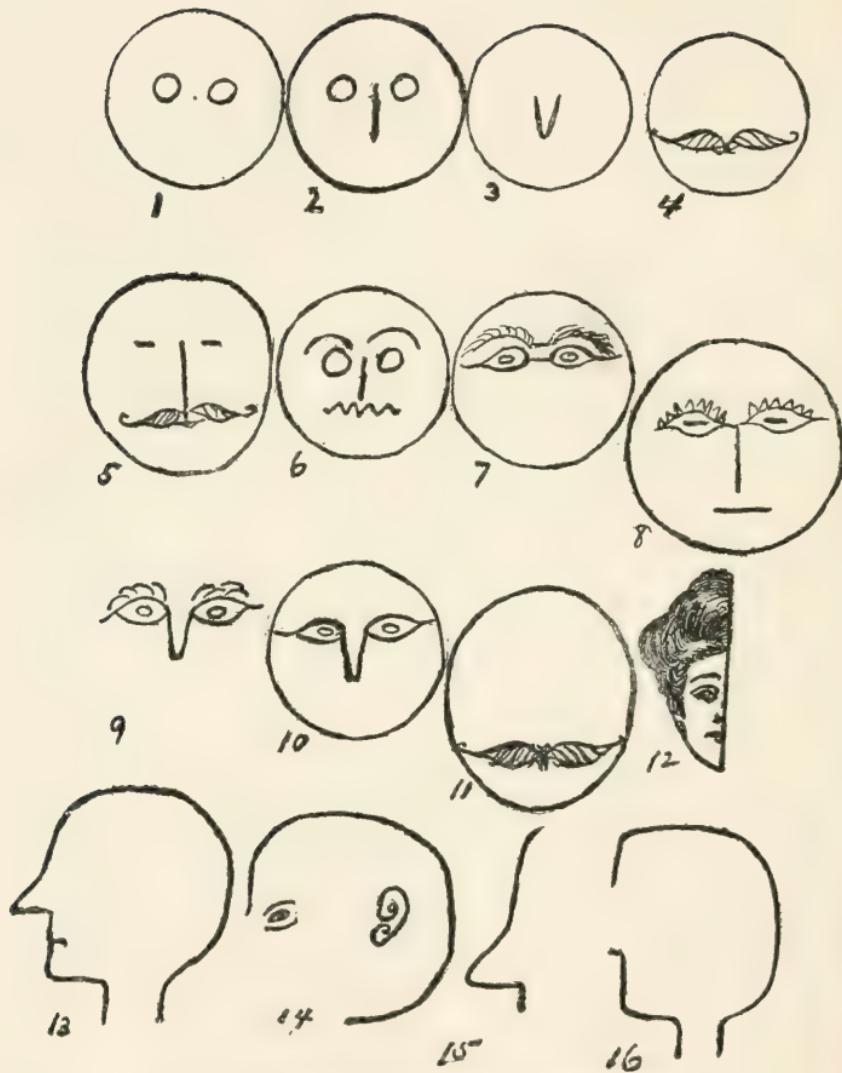


FIG. 6.—(DRAWINGS REDUCED ONE-FOURTH.)

In the table which follows, the figures on page 262 are referred to by number; what the child called the figures in reply to the question, What is that? being arranged by weeks in columns: —

Drawings of human face—front view.—

Week.	Figure No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
86th	“ B ”	“ B ”				B
89th	“ B ”	“ B ”				B and O
99th	“ B ” and “ O ”	“ O ”	“ B ”	“ B ”	“ B ”	B
103d				“ B ”	“ B ”	
116th			“ O ”	“ man ”	“ man ”	
122d		“ O ”, “ eyes ”	“ B ”	“ O ”	“ man ”	
126th	“ O ”	“ O ”	“ O ”			
139th	“ O ” and “ man ”	“ man ”, “ O ”	“ O ”		“ man ”	man
150th	“ O ”	“ man ”	“ O ”	“ O ”	“ man ”	man
156th	“ man ”	“ man ”	“ O ”, “ baw ”, “ nose ”	“ fly on uh O ”		“ ”

Week.	No. 7.	No. 8.	No. 9.	No. 10.	No. 11.	No. 12.
86th						ladle-la
89th						“ ”
99th	B	B	Fow-wu (flower)	man	B	“ ”
103d		man		B	O	“ ”
116th	O	man	nove (nose)	B	man	
122d	O, eyes	O, mouf, eyes	nove	O	man	
126th	O, “O got glasses ”	O			O	lady
139th	man	O, man				
150th	man	man	eye, glasses	“ big man ”	man, O	
156th	man	“ ”	eyes, nose	man	man, O	lady

Profile drawings of human face.—

Week.	No. 13.	No. 14.	No. 15.	No. 16.
86th	man			
89th	"			
99th	"	" B " and " man "	man	man
103d	"		no answer	man
116th	"	man	B	B
122d	"	"	"	man
127th	"	"		man
139th		O		
150th	"	man	B	
156th	"	"	line	man

Naming photographs. — In the last week of R.'s nineteenth month, I showed him a series of photographs, asking him to name each one as it was shown him. The order in which they were shown, and the name he gave each one, is as follows : —

Photograph of man with full beard, Age 70, called " Man."

"	"	"	moustache,	"	25,	"	"
"	"	young man, beardless,	"	20,	"	"	"
"	"	man with moustache,	"	26,	"	"	"
"	"	"	side-whiskers,	"	60,	"	"
"	"	"	full beard,	"	30,	"	"
"	"	girl,		"	7,	"	"babie."
"	"	"		"	11,	"	"
"	"	"		"	15,	"	ladle-la (lady).
"	"	woman,		"	30,	"	ladle-la.

An examination of the foregoing table shows that the child called all the photographs of men, regardless of age, " man " ; that is, a grown, male person was " man." *Size*, facial features and clothing, perhaps, were the determining factors in naming. The series contained no

photographs of boys or youths under twenty, but I have no doubt that photographs of boys less than full grown would have been called "babies," as that was his name, at that time, for real boys and youths who were not clearly of man's size. Thus, on one occasion, when we were driving, he noticed an under-sized man and cried "babie." In this connection, one may note in the table that the photographs of the girls aged seven and eleven were called "babie," while the girl of fifteen and the woman of thirty were "lādle-lās" (ladies). This rather peculiar classification was due in part, no doubt, to the fact that the child had not at that time mastered the words "boy" and "girl." "Man," "ladle-la," and "babie," however, were in frequent use, and when persons did not belong clearly in one of the first two classes they were classed with "babies."

Another series of tests was made with what—for want of a better name—I shall call "divided" pictures; that is, some of the pictures which I had gathered from magazines and elsewhere were cut in two or more pieces, each piece containing one or more features, which an older person would recognize at once as belonging to a given object. In the tests, the pieces were shown to the child one at a time with the question, What is that? his answer being written down at the time.

The series included—(1) a kitten's head (front view) which was divided just above the eyes in two pieces; (2)

a shoe cut in two at the instep leaving the "upper" in one piece and the foot and heel in the other; (3) the picture of a little girl of six cut across making three pieces, one piece showing the face, a second representing the child's feet and ankles, and a third picturing the remainder of the body dressed in the fashion of the day (this part of the picture showed the child's arms and hands quite distinctly, which served as the marks, I thought, by which R. recognized the picture); (4) a picture of a woman in a walking suit. This last picture was cut in two at the neck, the interest in the test being to find out what the child would call the figure after being decapitated.

The experiments with the "divided" pictures began in the eighty-third week and continued at intervals to the end of the third year. It is perhaps unnecessary to tabulate the answers which the child gave since they were uniform throughout, and can be stated in a paragraph.

(1) The two parts of the picture of the kitten were always recognized and named as *kă*, *tăt*, or *kittie*. Once one piece was referred to as a "bloke kiddie" (broken kittie). (2) The two halves of the shoe were named "shoe" or "shoos" every time. (3) The two upper parts of the picture of the little girl were called "babie," until the last quarter of the third year, when he began to name them "gull" (girl), *gullie*, or *lī gull* (little girl). The part showing the feet was called "shoos" at first,

and later, "feet." (4) The picture of the walking suit was named "lady" invariably until the last month of the third year when he called the figure "dwess" (dress). Once in the thirty-fifth month he remarked, "no head on uh lady."

CHAPTER XIV

BEHAVIOR OF THE CHILD BEFORE HIS IMAGE

IN his book of Fables, *Æsop* tells of the dog that mistook his own image in the water for another dog carrying a bone, and that he, being a very greedy dog, wanted another bone—so sprang at the image, and failed not only to get the other bone, but lost the one he himself was carrying. Had *Æsop*—or whoever the ancient was who wrote the fable—been an animal psychologist, he would have told us, perhaps, whether the greedy dog learned from this one unhappy experience to look with caution at dogs carrying bones. But *Æsop* was only a writer of fables, and the only fact of psychological import is that the dog mistook his own image for another dog. The fable being an old one we have also the fact that men have known for a very long time that animals are frequently puzzled and misled by their own images.

In more recent times, we have had a number of scientific inquiries into the question of just how animals of different species behave toward their images; whether they can learn that the image is not another creature of their own kind; and that it is related very closely to themselves;

and, if so, by what means, and what are the steps in learning these things.¹

As Preyer remarks, animals show a great variety of behavior in these respects. Some animals are pleased by images of themselves, and seem to regard them as they do a companion; others become angry and attack the image as a rival or enemy. Darwin thought it not improbable that, "When birds gaze at themselves in a looking-glass, that it was from jealousy at a supposed rival." Darwin also recorded the curious fact that the higher apes, with which he experimented, when given a small looking-glass "placed their hands behind the glass . . . but, far from taking pleasure in looking at themselves (they) got angry and would look no more."² Darwin did not undertake to explain the apes' anger. Perhaps it was a form of disappointment, or of impatience with an object which the animals could not understand, which they could not harmonize with their ideas of what such ape-like appearing things should be and do.

¹ Students have collected a vast amount of data with reference to primitive peoples' manner of thinking of images, reflections, shadows, echoes, dream-images, and the like. Persons who have read the chapters in Spencer's *Principles of Sociology* in which he develops "the hypothesis that religion is evolved from the ghost-theory" will recall that Spencer regards the primitive man's way of thinking about images, shadows and the like, which he takes for realities of some sort, as an important agency in developing the idea of a double, or other self, which exists apart from and which survives after the death of the body, *i. e.*, as a ghost.

² *Mind*, Vol. II, p. 289.

Preyer, who made a number of observations of the behavior of animals toward their images, relates that when one of a pair of ducks died, "the survivor betook himself by preference to a cellar-window that was covered on the inside and gave strong reflections, and he would stand with his head before this for hours every day. He saw his image there and thought perhaps that it was his lost companion." Preyer was of the opinion that a kitten, before which he held a small mirror, took its image for a second living cat, "for she went behind the glass and around it when it was conveniently placed." These few instances will suffice to indicate some of the forms of behavior with which pioneer investigators in this field have been concerned, and a few of the conclusions they were able to reach regarding a subject which is worthy of careful investigation.

Darwin and Preyer also made a number of observations of the behavior of infants before a mirror. Darwin records of one of his sons that,

"When four and a half months old, he repeatedly smiled at my image and his own in a mirror, and no doubt mistook them for real objects; but he showed sense in being evidently surprised at my voice coming from behind him. Like all infants he much enjoyed looking at himself, and in less than two months perfectly understood that it was an image, for if I made quite silently any odd grimace, he would suddenly turn around to look at me." At the age of not quite nine months, the child associated his own name with his image in the looking-glass,

and "when called by name would turn toward the glass even when at some distance from it."

Preyer began his experiments in his child's eleventh week and kept a much fuller record than Darwin. Preyer's record, considerably abridged, follows:¹

"Eleventh week, — the child does not see himself in the glass; his image does not make the slightest impression on him; fourteenth week, — the child looks at his image with utter indifference; sixteenth week, — the reflected image is still either ignored or looked at without interest; seventeenth week, — for the first time the child regards his image with unmistakable attention, and indeed with the same expression with which he is accustomed to fix his gaze on a strange face seen for the first time; three days later the child for the first time undoubtedly laughed at his image; twenty-fifth week, — for the first time the child stretched his hand toward his own image; twenty-sixth week, — the child is delighted at seeing me in the glass and *compares* the original with the image; thirty-fifth week, — the child gayly grasps at his image, and is surprised when his hand comes in contact with the smooth service; fifty-seventh week, — he looked at his image then passed his hand behind the glass and moved the hand hither and thither as if searching; sixtieth week, — the child distinguished with certainty his mother from her image; sixty-second week, — for the first time Preyer saw the child making grimaces before the glass, laughing as he did it; sixty-ninth week, — the child looks at himself in the glass with pleasure and often; signs of vanity are perceived; twenty-first month, — the child laughs at his image in the glass, and points to it when I ask, where is Axel? thirty-

¹ *The Mind of the Child*, Part II, p. 197ff.

first month, — it afforded the child great pleasure to gaze at his image in the glass."

At this point, may be reported my observations of the behavior of the two children R. and J. in the presence of the mirror. My first observation of the child R. was made in the last week of his fifteenth month. Evidently he was pleased at the sight of his image, cried "babee," and leaned over and kissed the image.

In the last week of the seventeenth month, the child behaved exactly as he did on the former occasion when placed in front of a mirror. No further observations of R.'s actions toward his image were made until the first week of his twenty-first month — "When," to give the language of the note, "the child is allowed to stand in front of a mirror he tries to play with his image precisely as he would with a real child. He tries to give the 'babee' a ball, kisses the image, says 'peep' as he looks around the edge of the mirror." Three days later, his actions, when standing in front of the same mirror, were found to be the same as on the former day ; that is, he tried to get the "babee" to take the ball ; played peek-a-boo with it ; talked to it as he would to a real baby. The only conclusion which seemed warranted by the facts, as I saw them, was that the child thought the image to be a real child. The next observation was made in the first week of R.'s twenty-eighth month, as follows : — I took a large mirror from the wall and stood it in front of the

child. He stood silent, gazing at his image for ten seconds or more, then drew a deep breath, and looked toward me. I asked, Who is it? to which he replied, "Babie," "Wăwee" (his name for himself). Evidently he was puzzled, and I thought just the least particle alarmed or fearful at the sight of the image when he first saw it. But after the first wave of bewilderment or alarm had passed, the child enjoyed looking at his image and protested when I hung the glass in its place on the wall. The most surprising part of the child's behavior on this occasion was his trying to grasp the image of a ball which he saw reflected in the mirror when I made the experiment of standing behind him and holding a ball so its image fell in the mirror at a convenient place to suggest reaching for it. One trial was sufficient, however, to teach him that the ball could not be gotten in that way, and he thereafter refused to reach for the image, but turned to the real ball. (Compare the experiments with the knife and watch — described in the next paragraph — with the child J. in his thirteenth month.)

When the child J. was nine days past his first year, I observed him as he stood in front of a large mirror which reached almost to the floor. On that day, his conduct was like that when in the presence of other children — laughing at the sight of the image, leaning over and kissing it, crying "ah," trying to take hold of the fingers, nose, hair and so on. He stood thus entertaining him-

self with the image for four minutes then went to something else. Three days later, I allowed him to look at his image in a small hand-mirror. On that day he leaned over and kissed the image as he would have another child. On the following day, I let the child stand in front of the large mirror mentioned above. At first, he leaned forward and kissed the image as on former days. Then, as he stood looking at his image, I stood behind him at a distance of perhaps three feet and held a penknife out of his range of direct vision, but so that the reflection of the knife in the mirror would fall at a position convenient for reaching, my thought being that he would reach for the image of the knife at once. But I guessed wrongly, for he turned around almost instantly and reached for the real knife. After a while I varied the experiment by suspending a watch from the chain so that its image in the mirror fell at a point convenient for reaching. When the child first saw the image he made a slight motion toward it; but he inhibited the motion at once, turned around and reached for the real watch. Nine days later, I repeated the experiments with the knife and watch with results like those of the earlier days. Why the child should seem so naïve when looking at his own image, and on the same day prove himself so sophisticated with reference to the images of the knife and the watch was a problem for which I know no better solution than one offered by Dr. A. E. Davies, as follows:—

"We have in each case the customary behavior of the child toward each particular object. His acquaintance with 'babees' depends less upon contexts than possibly any other object. Hence 'surprise' does not operate in favor of discrimination. The knife and the watch, on the contrary, have always had a definite setting. The child's behavior toward these objects would seem to indicate that the reflection of the customary context was not noticed by the child. If this is so, it is a case of association by contiguity; the reflection of the knife or watch reviving the image of the father, and both together resulting in the appropriate reach for the object."

I have tried to account for the difference of the two children, R. and J., with respect to their impulse to reach for the images — of the ball, in the one case — and for the images of the knife and watch in the other. The child R. — well along in his third year — tried to grasp the image of the ball, while the child J., barely past his first year, promptly turned to the real article, knife or watch. The only theories by way of explanation which occur to me, and which are consistent with other facts, are — either the older child, R., is the more suggestible, impulsive, and images take immediate possession of his motor apparatus; or through frequent reaching for and grasping balls, the path from the idea "ball" (or other object) to reaching for it has become smoother in the older child than in the younger.

In concluding this brief account of the baby's behavior before the mirror we may inquire what are the agencies

and correlations within the child's experience which enable him (1), to pass from a stage in which he regards his image as a real, *i. e.*, tangible, object to the stage in which he sees that it is not a real object, a baby, *e. g.*; (2), to realize that the image is related in some way to himself, and, in some cases, cause the child to look upon his image as another self, or double. With reference to the first point, it seems probable that the child learns that the image is not a real object through his failure, when trying to touch or grasp the image, to get the same sensations he gets in reaching for, touching, grasping, and handling real objects. With reference to the second, we may suppose that the child first learns through visual sensations and certain sensations of movement that the movements of parts of his body — his feet, arms, hands and so on — are parts of the same group of experiences which he gradually comes to think of as himself; that is, he sees some of these movements and he "feels" them, at the same time, as belonging to himself. Now, when he looks in a mirror and at the same time moves parts of his body, *e. g.*, his head, or his arms when he tries to grasp the image, or when he opens his mouth — he observes that the changes in the image and the changes which he sees and "feels" his own body making occur at the same time, and so thinks the former changes are in some way related to the latter. He sees and feels his hand move, and he sees a similar movement in the mirror at the same time; he

feels his head move and he sees a change in the image and so comes to think of the two in the relation of cause and effect. It seems reasonable to suppose, to use the more technical terms, that the child learns that the image is related to himself partly through the blending of his visual sensations, and partly by the blending of his visual and kinæsthetic sensations.

This explanation seems to be in substantial agreement with the one offered by Professor Sully, as follows:—

“Little by little,” Sully writes, “the child gets used to the reflection, and then by noting certain agreements between his bodily self and the image, as the movement of his hand when he points, and partly, too, by a kind of inference of analogy from the doubling of other things by the mirror, he reaches the idea that the reflection belongs to himself.”¹ And yet, just what these hand-movements are, and what is the evidence for believing that the child notes agreements between them and the image, and whether the child distinguishes between foreign objects and their images before or after he discovers that his own image is not another person, and how the two lines of discovery are related — these questions, so far as the writer knows, have not been the subject of careful observation — the only method of arriving at satisfactory conclusions regarding them.

¹ *Studies of Childhood*, p. 113.

CHAPTER XV

LANGUAGE

No class of infant activities appeals more strongly to the interest of both the learned and the unlearned, the scientific and the unscientific, than the baby's struggles, defeats and victories, in acquiring mastery of articulate speech. Long before the scientific investigator laid claim to this fascinating and promising territory, parents and kinsfolk had taken pride and satisfaction in noting roughly the important steps in the baby's progress in learning to use his native tongue. Folk-lore finds some of its quaintest forms clustering about the speech learning process, and early mythology taught that speech is the gift of the gods. It appears, therefore, that civilized man, even in his least reflective stages, had struck upon the speech faculty as a peculiar, distinguishing characteristic of his kind. To his objective way of thinking, speech, more than any other endowment, marks man as the paragon of animals.

To those who approach the problem of infant development critically and scientifically, the development of the ability to use articulate speech presents problems of peculiar interest, and for two principal reasons: first, because they believe that a systematic, critical study of the speech acquiring process in the individual child will throw

light upon the most important problems of psychogenesis. What mind is like in its beginnings; how it begins to emerge from vague, shadowy, confused processes to processes clear and definite; how it develops from stage to stage; what are the factors involved in this unfolding process;—these are some of the questions which they believe can be lighted up by watching the development of the speech function in the individual child.

The questions just enumerated, as was stated, are of especial interest to students of the mental development of the individual child as a representative of a race having a highly developed language. In the second place, students of anthropology and philology have been attracted to the study of the speech development of the infant in the hope that it will yield some help in answering the questions regarding the origin and development of speech in the human race.¹ And this hope has not

¹ Jespersen, in the closing chapter of his work, *Progress in Language*, writes concerning the investigation into the origin of language, "If we are to have any hope of success in our investigations, we must therefore look out for new methods and new ways." Then, after giving his reasons for expecting little help from the observations of older children's efforts in learning an already existing language, he continues, "If we are seeking some parallel to the primitive acquisition of language, we must look elsewhere and go to baby language as it is spoken in the first year of life, before the child has as yet begun to 'notice' and to make out what use is made of language by grown-up people. Here in the child's first purposeless murmuring, crowing, babbling, we have real nature sounds; here we may expect to find some clue to the infancy of the language of the race."

proven vain. Students of philology discover many points of similarity between the developing speech of the infant and the speech of existing primitive peoples,—whose speech, presumably, represents early stages in the evolution of articulate speech in the race — and adherents of the rival theories regarding the origin of the human language— the “pooh-pooh,” the “yo-he-ho,” and the “bow-wow” theories, as they are sometimes designated, find in infant speech many facts to support their respective views, suggesting that one alone is inadequate, and that, perhaps, all are required for a full explanation.

But it is not the purpose of this chapter to lead into this vast and largely unexplored land. It may not be out of place, however, to observe that if one would journey into this primitive world with the expectation of bringing back treasures worth the while, one must be not only philologist, but also master of the evolutionary method and literature—particularly of the biological and psychological sciences as they have been developed in recent years. Only the intellect armed

The study of the speech of infancy, then, is one source from which, in the opinion of Professor Jespersen, light may be expected on the problem of the origin and development of human language.

It seems likely that a still richer field would develop in a study of the influence of the speech of infancy and early childhood in modifying existing tongues, in creating new dialects, and even new tongues. As one considers the speech formations of babies and little children, one cannot but think that infant speech must have made in all times immense contributions to existing tongues, and also that it must have been a powerful factor in creating new languages. So far as I know, philologists have not taken as full account of this factor as its importance would seem to warrant.

with the ripest modern scholarship can grapple with the questions relating to the origin of man, what the progenitor of man was like and what he did ; or can hold in its grasp the incidents in the drama of humanity rising out of animality ; or even what primitive man was like, what sorts of ideas, fancies, feelings, emotional states, desires, aversions, purposes, made up his mental life. The question of the origin of human speech will be rescued from what Professor Whitney called its "bad repute" when such an intellect possessing such a training addresses itself to the question. Our problem in this chapter is the very modest one of indicating some of the principal stages of speech development in an individual child, and of illustrating the chief features of each stage, and to that task we may now proceed.

STAGES IN THE SPEECH LEARNING PROCESS

The process of learning to use the native tongue may be divided, for purposes of convenience in description, into the following periods or stages : (1) reflexive crying, (2) crying expressive of various sorts of discomfort, (3) definite expressions for feelings of comfort and discomfort, (4) the understanding of soothing, caressing sounds and harsh, scolding sounds, (5) crowing and pre-linguistic babbling, (6) the association of words heard with definite objects, events, or situations, (7) the association between statements and requests of others and definite actions in response on the child's part, (8) attempts upon request to repeat the expressions of others — the beginnings of imitative speech, (9) the uniform use of sounds and words to express wishes,

feelings, facts or ideas, (10) naming things seen or heard, (11) spontaneous imitation, (12) understanding and replies to questions, (13) exclamations, remarks, observations, statements, being a further development of the speech activity described in (9) above, (14) the questioning period.

It will be understood, of course, that there are no sharp lines of demarcation between these stages. All that is meant is that certain speech activities are new, characteristic of, and prominent in a given stage or period. Indeed, the general principle of the gradual transition from one stage to another, of no sudden leaps or breaks in the general process of growth and development finds no better illustration than in the speech learning process. Not only is there a very gradual transition from one stage to another, but very many of the activities of early stages persist and are found in the later stages, and very often sporadic instances, or faint suggestions of later activities are observable in the early stages. And yet, for purposes of description, it is convenient to mark the process into stages.

(1) *Reflexive crying.* — The beginnings of language are usually traced to the reflex crying of the newly born babe. Preyer likens these early cries to the peeping of a chick that is breaking its shell, or the bleating of the newly born lamb, and observes that they have no more intellectual or emotional significance than the first cries

of these animals. They are produced as well by a child without a cerebrum as by a child with one. The basal ganglia and the appropriate stimulus are all that are necessary on the neural side for their production. These first cries, then, have no conscious value except possibly in the bodily reverberation, the kinæsthetic sensations accompanying the physical activity of crying. What one means then by saying that language has its beginnings in these first reflexive cries is that much of the physical apparatus which is used in later speech activities is involved in the early reflexive cries. The vocal cords, the organs of respiration, the muscles of the throat and tongue get a sort of strengthening and exercise which are valuable in subsequent speech efforts.

We shall not go into the question, why the newly born babe performs the particular activity which we call "crying," rather than some other, crowing or laughing, for example, or why he makes any vocal sound at all. All sorts of reasons, poetic, scientific, and theological have been suggested. It is sufficient for our present purpose, perhaps, to remember that the crying of the infant just born is occasioned by the physical shock of his new surroundings, the inrush of air to the lungs, and that crying is a reflex like sucking and clasping with the fingers. The first vocal utterance then is a cry. First a sort of sniffle, a moment of slow wriggling, an uneasy stretching and bending of arms and

legs, like one aroused from deep sleep, then the sound called crying sometimes lustily, sometimes feebly. Observers agree that the first cry is usually a short ā, long drawn out, and having a slight twang or nasal sound.¹ (I have heard babes of six months gestation utter a feeble cry more like ē which probably requires less muscular exertion, less muscular tension than the short ā which is uttered by the more vigorous nine months baby.)

(2) *Differentiation of crying in discomfort.*—The monotonous reflexive crying, described in the preceding paragraphs, which serves to express the general condition of discomfort soon gives way to cries which vary with the *kind* of discomfort the child is experiencing. The cries soon come to have expressional value. They differ in pitch, duration, timber as the mood or feeling of the child varies.² Physicians and trained nurses soon learn to distinguish among the meanings of the cries of babies a few weeks old. The cry of pain is high and piercing, an uncomfortable position occasions only whimpering. Hunger has its peculiar expressive cry, so have the sensations of cold, wetness, and uncomfortable cloth-

¹ For a valuable theoretical exposition of the mechanism of the early speech activities on the neural side, see Collins, *The Faculty of Speech*, Chap. III.

² In this connection, one thinks of Darwin's description (*Descent of Man*, Chap. II) of the different kinds of cries or barks by which the dog expresses his various feelings. There are barks of eagerness, as in the chase; of anger, of despair, of joy, of demand or supplication.

ing. These are the earliest differentiations of the reflexive cries of the first period. Here belong also the cries caused by unpleasant tastes and smells. For example, the child R. made an outcry and whimpered when on the forty-sixth day he got a whiff of liniment.

In this period whatever of comfort the child may experience is not expressed by vocal utterance, but by a pleased or calm facial expression. The baby's ability to express its discomforts is far in excess of its power to express whatever joy and happiness it may feel. And this relative superiority of the mechanism for expressing discomfort continues, for most persons, throughout life.

(3) *Expressions of comfort.* — The third stage is characterized by the appearance of expressions of comfort, a sort of cooing, the utterance of a happy mood when the baby is lying comfortably, rolling about in his crib, moving his arms and legs. In this period the vowel sounds are predominant. For example, the child R. was observed on the eighth day of the second month rolling about and uttering the sound "I-E" over and over.¹

¹ Every observer of the speech of babies and of little children knows that it is impossible to print signs which represent accurately the inflections, the cadences, the timber, the notes of desire, of fear, timidity, of assent and dissent, of expectation, surprise, anxiety, and of protest, so abundant and rich in early speech. For the greater part, the reader must draw from what he knows of baby talk in order to get the meaning out of any attempt to represent baby babblings or talk in print. Some aid is given, however, by the use of diacritical marks, and they will be employed in this section whenever it is thought they will help in telling how a word,

(4) *Soothing and harsh sounds distinguished.* — Another phase of the language learning process is the ability of the child to distinguish between the soothing, caressing speech of the nurse, or others, and harsh, scolding sounds. The caressing sounds get their meaning perhaps from being frequently associated with gentle and tender handling, and harsh sounds come to have a certain response because associated with rough, or indifferently gentle handling, and not because in either case the distinction is untaught and instinctive, although, as we saw when discussing Fear, loud and strange noises often cause discomfort in early infancy. If a child were accustomed to hearing soft words and being beaten at the same time, such words would soon come to arouse fear and trembling. If, on the other hand, gentle and caressing treatment were associated in the experience of the child with harsh sounds, the latter would soon come to be soothing and quieting.¹

(5) *Crowing and pre-linguistic babbling.* — Stage three, the stage of vowel babbling in comfort, passes

or syllable spoken by the child sounded. As a rule the correct spelling of the word in English has been retained, but in some cases some liberty has been taken when it seemed likely that by that means a better representation of the child's speech could be made. The system of diacritical marks employed in these *Studies* is based upon the one used in Webster's Dictionaries.

¹ For interesting discussion of the question whether infants instinctively know the meaning of different emotional expressions, see Darwin *Expression of Emotions in Man and Animals*, Ch. XIV, p. 358f.

gradually into the babbling stage proper which is strongly marked by countless, meaningless syllables uttered mainly when the child is in a cheerful frame of mind, though sometimes one hears them when the child is fretful.

Observers have not overlooked the importance or significance of this period. Sully calls it variously, "the period of voice play and rehearsal," "preliminary practice," of "undesigned trying of the articulate instrument"; and Preyer maintains that for all healthy children the greatly preponderating majority of the sounds the child makes use of after learning verbal language, and many other sounds besides these, are correctly formed within the first eight months, not intentionally, but at random.¹ Mrs. Moore was of the opinion that, "at the close of the fourth month her child had made well-nigh all the sounds that occur in the language."² Certain it is that when viewed from the standpoint of subsequent speech development, the babbling process or period has all the appearance of getting together a mass of raw material which is to be put into intelligible and significant forms later when the building process proper begins; or when, to use one of Sully's figures, "the speech protoplasm begins to dif-

¹ *Op. cit.*, Part II, p. 76. Preyer places the early movements of the muscles of the larynx, mouth, and tongue, which give us the vast variety of vocal sounds, in the same class with the other innumerable, superfluous, unintentional, random, muscular movements of the infant.

² *Op. cit.*, p. 115.

ferentiate and to assume definite forms." But we must not get lost in metaphors: the simple, plain statement is that during this period the child utters countless syllables, and probably one or more of every sound he will ever use in speaking his native tongue. And it is not difficult to detect in this preliminary stage a great many sounds for which he will never have any use, unless he should learn a number of foreign tongues.

If we were to assign a time to the babbling period it would be the second half of the first year and the first quarter of the second year, the latter part of the period being richest, as a rule, in the number and variety of sounds uttered. Of course, babbling continues throughout the second year, and even into the third, if one may think of the crude attempts at singing or humming as a sort of revival or survival in rhythmical character of the early babbling.¹

(6) *The association of words heard with definite objects, events, and situations.* — Under this heading will be reported illustrations of early associations between objects and their names when spoken by members of the household. A child can be led somewhat earlier, and much

¹ Two kinds of babbling may be distinguished: one which seems spontaneous and purposeless; the other which appears later, and in which there seems to be more effort, more will, more of the child's self. In the second, the child seems to be aware of what he is doing, and does it half intentionally; we say he is "talking," or *trying* to talk to his toys, playthings, and his companions.

more easily to form associations between spoken words and objects than he can be induced to try to repeat words spoken to him, and these associations can be formed weeks before they would arise without teaching. Preyer quotes the remarkable case of Linder's child forming an association between the word "tick-tock" and the clock at the age of eighteen weeks.¹ In the complete account, it appears that the tick-tock association was formed under very favorable circumstances. The child was absorbed in looking at the clock when the father appeared on the scene and carried the child to the clock at the same time speaking the word "tick-tock." Probably the association was between the word "tick-tock" and the memory of having been carried to a certain object; the sound of the word revived in the child's mind the former image or experience, rather than an image of the particular object—clock. The sound "tick-tock" was merely one element in a block of experience in which the image of the clock was another factor or link. The same child at the end of the seventh month answered correctly by pointing when asked, where is your eye? ear? head? mouth? nose? In the list of associations just named, it is likely that they were formed only after much drill

¹ *Op. cit.*, Part II, p. 69f. The case is quoted by Preyer to illustrate the fact that understanding often runs far ahead of the first imitative speech, the Linder child not making any attempt to imitate words heard until the tenth month.

and repetition. Similar to the case quoted from Linder, are those Preyer quotes from Sigismund, Strümpell, and Darwin.¹ Sigismund relates that long before his child tried to imitate words or gestures, namely, at the age of nine months, he distinguished accurately the words "father," "mother," "light," "window," "moon," "lane," for he looked or pointed at the object designated, as soon as one of these words was spoken. Strümpell's daughter, in her eighth month, understood the question, where is the tick-tock? and Darwin reported that at seven months, his boy associated his nurse with her name so that when it was called out he would look around for her. Miss Shinn states that, "at eleven months her niece's understanding of speech had grown wonderfully — she knew fifty-one names of people and things; twenty-eight action words; — and a few adverbial expressions like 'where,' and 'all gone,' eighty-four words in all, securely associated with ideas."

My own notes relating to the earliest instances of association between words heard and particular objects, state that the first association noted was between the word "street-car," and that object (fifty-first week). In order to entertain R., he was frequently taken to a window from which passing cars, often brilliantly lighted, could be seen. The sight always greatly pleased him, and

¹ *Op. it.*, Part II, p. 222ff.

after he was able, he would stand at the window by the half hour, watching the passing cars. Of course, while looking at the cars he often heard the word "car," and so was formed one of the earliest verbal associations. About the same time, the word "birdie" was associated with a canary bird which he saw often, and which he enjoyed watching as it sang or flitted about its cage. In the fifty-second week it was noticed that he would begin to look around for the ball when the word "ball" was spoken to him.

(7) *The association between statements and requests of others and definite actions in response on the child's part.*¹

— This class of associations may be illustrated by reference to the associations which R. formed early in the second year between hearing the expressions "warm your hands," "say 'bye bye,'" "brush your hair" and definite actions in response on his part. Thus when one said to the child, "warm your hands," he would hold them out as if warming them. In each of these associations, the appropriate movement in response had been taught the child by putting him through the movement at the same

¹ Preyer observes that this is the last of the "animal" stages of development on the language side. By the close of the first year, the child is on a higher plane mentally than a very intelligent animal, "but not on account of his knowledge of language." The baby that responds correctly to a few words or sounds is not far in advance of the horse that reacts in a uniform way to "whoa," "gee," "haw," or the dog that responds to "give," "come," "steady."

time the words were spoken. For example, while holding the child one would say "warm your hands," at the same time holding his hands toward the fire. That the child failed to comprehend the full meaning of the words spoken to him became clear when it was found that he held out his hands upon hearing the words, no matter whether he was near a fire or not.

It should be said that we are not to suppose that the child, at this early stage, hears expressions or requests, like those just named, as wholes made up of a given number of parts. At this time, there is little or no discrimination of parts of the wholes heard. An expression or request is merely a volume of sound in which some one or two factors or notes stand out distinctly enough to get associated with a fairly definite piece of conduct on the child's part. Thus, when one says to the child, "brush your hair," we are not to think that the child hears three distinct sounds, and only the least reflecting person supposes that the child hears three distinct words — brush-your-hair — that is, understands the meaning of each of the three words included in the request. What exactly the child's mental processes are when he hears requests like those just quoted, and then proceeds to comply with them is a matter to be determined in each individual case. But in most instances it is safe to conjecture that it is the peculiar inflection, cadencing, and points of emphasis, which give the child the cue to, the suggestion of the ap-

proper action on his part. In other instances, the cue is some single sound in the complex which makes up the entire expression. Some sound in the total stands out and is associated with a particular action on the part of the child.

(8) *The beginnings of imitative speech.* — According to the outline of the general order of speech development set forth above, links of association are formed between words heard and certain objects, actions, or occurrences before the child shows any tendency to repeat, of his own accord, the expressions of others. Understanding the speech of others appears, ordinarily, before attempts to repeat it, and this is as one would expect. It seems on its face a simpler process. It is also easier to force premature understanding of spoken language than premature imitation of others' speech. Early imitative speech is very capricious: it appears in the life of a given child when it gets ready, and not a whit sooner. And yet it should be said that whether a child begins to understand spoken words before he begins to imitate them depends somewhat upon the efforts of those in charge of the child. By persistent efforts, one can get a child to try to repeat words and syllables long before they mean anything to him, and long before he would make the attempt of his own motion. So in considering early speech imitation, it is well to inquire what is meant when it is said — a child imitated so and so, at such and such a time; that

is, was the imitation spontaneous or was it drawn out by the efforts of others? To illustrate, Sigismund says that his boy did not, of his own accord, imitate any sounds until after the fourteenth month, but imitation upon the request of others occurred three months earlier. In my own experiments, I tried at different times in R.'s tenth month to get him to repeat after me such syllables as bă, dă, pă, all of which he uttered frequently in his babbling moods. On the 292d day I got feeble responses, half whispered and barely audible. At three different hours of the 296th day, I tried to get the child to repeat after me the syllables just named, and the results in every instance were such that there could be no doubt that the child did repeat, imperfectly to be sure,¹ the syllables which I had spoken for him.²

(9) *The use of sounds and words to express wishes and ideas.*—Very often before the end of the first year the child uses uniformly a small number of sounds or

¹ The first imitations, whether suggested or spontaneous, of others' speech are, as Sully says, "rather of tone, rise and fall of voice, and apportioning of stress or accent than of articulate quality."

² It is of interest to note in this connection that R. imitated certain bodily movements like nodding the head, jumping up and down with the body as one sits, and shaking a paper, before he would imitate vocal and throat sounds. The more interesting since it is observed that some children imitate sounds before they do bodily movements. For example, I observed that the child J. repeated after me a sound like the barking of a fox-squirrel and also syllables like da and a before he would try to repeat bodily movements like shaking the hand, or nodding the head though I tried often to call forth these movements by making them for him.

words to express wishes, facts and ideas. Miss Shinn's niece, at the end of the eleventh month, said, "da" when pointing out or admiring an object; "nanana" as expressive of refusal and protest; "mom mom mom" to express a particular wish; and "gong" to express the fact of disappearance, absence, failure, denial, etc. Preyer relates that at the close of the eleventh month, his boy had formed an association between the expressions "atta," or "hatta" or "hatai" or "hodda," and the idea of disappearance. That is, when something disappeared the child said, "atta" or "hatta" or "hatia" or "hodda," and at the close of the first year the Preyer child expressed eager desire by, "a-manananana."¹ Mrs. Moore states that in the forty-second week her child used the words, "mamma, nin nin" to express his desire to be fed; also that, soon after, "papa" became a proper name for a particular individual.² It will be noted, in the cases of these three children, that only a few expressions were used with uniform designation before the end of the first year, although, generally speaking, the speech development of the three children was precocious. One notices also that their expressions or utterances, even when used with apparent purposiveness, were more of the nature of exclamations — the expression of a mood, than distinct, articulate expressions of wishes, ideas, facts, or observations.

¹ *Op. cit.*, Part II, p. 111 f.

² *Op. cit.*, p. 121.

The stage we have just discussed brings us to the point in language development which the average child reaches during the first year. When one considers the range and character of the linguistic attainments of the one year old child, one finds, (1) that he is in the high tide of the babbling period, that babbling is easily the dominant speech activity. (2) The child is acquiring greater facility all the while in articulating difficult syllables. For example, we find him uttering the difficult "th" as an initial sound. (3) Expressions consisting of two syllables are frequent, the rule in fact, and expressions of three syllables are sometimes heard. (4) We find also that the child is beginning to understand much that is spoken to him, especially, simple requests like "go to sleep," "let me hear the tick-tock," and others quoted in a former paragraph. The meaning of these requests had been learned in connection with certain movements; or rather the appropriate movements had been taught in connection with the verbal expressions, sometimes by actively directing the child's movements, much as the animal trainer takes his subjects through the trick according to a system of signals.¹ (5) It is found also that a number of objects are firmly associated with the sound of their

¹ For discussion of the possibility and limitations of teaching animals tricks by putting the animals through them, see Thorndike, *Animal Intelligence*, p. 70ff.; *Monograph Suppl. to Psych. Rev.* No. 8, Vol. II; also *Pop. Sci. Mo.*, 55, p. 480. See also Kline's and Small's studies of animal intelligence, *Am. Jr. Psych.*, Vols. X, XI, XII.

spoken names. Certain articulate sounds are linked in the child's mind with certain objects, the sound of the name calls up in the child's mind a particular mental image, and so out of the confusion of Babel—as oral speech is to the child at first—distinctions and meanings are beginning to appear; sounds are coming to have character, definite meaning and objective reference. (6) The child is beginning to imitate mechanically single words said for him. By "mechanical" imitation is meant here that there is no association between his utterances and ideas. All one can say is that when certain words or syllables are spoken with clearness and emphasis, the child seems to try to repeat them. At least, he utters sounds which are rough imitations of the copy set for him. From this time forward skill in reproducing sounds heard improves rapidly. (7) The speech of the first year may be described as spontaneous, impulsive, instinctive when compared with the intelligent and purposive speech of later years. The child utters vocal sounds just as spontaneously as he flourishes his arms, or grasps at attractive objects. The speech apparatus is there and the energy of the child sets it going. So one may speak of speech as instinctive, impulsive, not acquired—in the sense that the babe utters, without suggestion of a copy from others, and almost from birth, a great variety of sounds and syllables to express his various moods. Likes and dislikes, assent and dissent, im-

patience, anger, aversion, surprise, pleasurable anticipation, are expressed by easily understood, untaught sounds long before the close of the first year.

THE DEVELOPMENT OF THE SENTENCE

The development of the sentence is a phase of the speech learning process that has attracted a good deal of attention among the observers of child language. The earliest forms of the sentence, the rudiments out of which the sentence proper grows are those crude, half articulate sounds or syllables uttered — often before the end of the first year — to indicate a wish or to express some fact. To the first class, expressions of desire, belong vocal utterances, *e. g.*, hī, hī, hē, hū, ēh, and the like, which often accompany early reaching for things. To the second class, belong the ātta, hoeda, hāta spoken by Preyer's child in the eleventh month to express the fact of disappearance; for example, when some one left the room, when the light was extinguished, and the like. Other primitive forms of the sentence are the "M-gm" or "Ng-gng" or "M-ga," and the "Da" or "Dng" or "Did-da" used by Miss Shinn's niece, the former to express the fact of disappearance, failure, denial; and the second, "was suspiciously often enough ejaculated when the little one threw out her hand in pointing, or in exulting in getting to her feet to suggest a faint consistency in the use of the expression under these circumstances." Similar to the sounds re-

ported by Miss Shinn, was the exclamation "čh" uttered by the child J., when, after considerable effort, he succeeded in getting a can-lid to stay on a can, or after getting a pencil to stick in a spool-hole (twelfth month). The "uh" spoken by J. as he held up an article which he wanted some one to take, also belonged probably to the class of early nature sounds which children use to express their desires or observations. Different in origin, but not different in character, are the first crude, indistinct, imitative vocables which become associated with certain actions on the child's part. For instance, the child J.'s *ăt*, *ăct*, *năt*, *măck*, *ăga*, *ăka*, for "thank you" — sometimes one, sometimes another and often barely audible — as he laid a pencil or other article in one's hand.

To such humble and unpromising beginnings as those described in the preceding paragraph, we must look if we would know the nature of the earliest vocal expressions which shadow forth the completely rounded sentence — the majestic utterances of the lawgiver, the profound deliverances of the seer, the delicately and exquisitely moulded creations of the orator or poet.

Following fast upon the sentence-sound come sentence-words, single words used to name things perceived or things wanted. For example, R. exclaimed "babee" at the sight of his image in a mirror or other reflecting surface; "ti-tit" as he held a watch to his ear; "ack" at the sight of a hat he wanted; "baw" when he was unable

to find a lost ball. The next step consists in the use of the same word to express a variety of meanings ; sometimes to convey facts and ideas which occur to the child, sometimes to express a wish, sometimes to command—the meaning in each case being gathered from the circumstances, or, as Sully observes, “from the intonation and gesture.” For example, R. used “dee” to mean “sit here,” “put it here,” “I am sitting down,” “I want to get down,” “put it on a lower shelf in order that I may be able to get it”; and “hod” was used to mean “the bread is hard,” “I cannot reach it,” “the book is heavy,” “the wheel will not roll,” “make a drawing of a *big* horse.” Preyer illustrates the manifold meanings which a single word may have by reference to his child’s use of “papa” to mean, (1) come play with me ; (2) please lift me up ; (3) please give me that ; (4) help me get up on the chair ; (5) I cannot, and so on, the particular meaning in each case being indicated by looks and gestures.

It is curious to note how, at this stage, the child clings to single words to express his ideas, how unwilling he is to try to combine two words into a single expression even when one sets him the copy made up of two words which he uses frequently, one at a time. For example, R. in his twenty-first month used both “moah” and “wheat” meaning that he wanted more cereal. But he would not try to repeat after me “more wheat” though the copy was set for him a number of times in the course of the

month. Perhaps it was not wholly the child's consciousness of his inability, as one might think at first (ordinarily he was willing to try almost any combination of syllables which was suggested) which made him unwilling to try to combine the two words "more" and "wheat," but partly the fact that he had formed the habit of speaking the words separately on certain particular occasions, namely, when he wanted more food. Habit was stronger than suggestion. It was noted also that for several months after the child began to combine words into sentences, the single sentence-words were retained and continued as prominent features of his speech. The older forms lingered long, but were gradually, and finally entirely displaced by the newer ones.

It is a notable day which brings the first sentence of two words. As a rule this extraordinary performance may be expected in the latter half of the second year, though some observers name earlier dates for its first appearance. In this matter, as in many others, there is great variety among children.

There seems to be no rule as to the individual character of the words which are selected for these early combinations, or as regards the relation which they bear to one another. Sometimes the words are a noun and its modifier, as R.'s "bī bǔ" (I am a big boy); sometimes a noun and a verb, or noun and adverb, sometimes two nouns with all conceivable cases, and meaning all sorts of

things, even things which would require for full and complete expression a long, complex sentence ; or even, in some instances, two or more sentences. For example, the first two-worded sentence which Preyer's child spoke (haim, mimi) requires for full expression a complex sentence consisting of nine English words, *i. e.*, "I would like to go home and drink milk." And the child R.'s "wēad moom" meant, "Please read some more about the cow jumping over the moon," and "bětie Dăt," "I want some food (betie) to give to Jack" (his toy horse).

After the child once begins to combine words into sentences, the essential additional things which must be mastered before he can speak even plain English are : (1) he must learn to use just the right number of words ; enough, but not too many ; (2) he must master the conventional order of words in the English sentence ; (3) the intricacies of English inflection must be learned ; (4) he must have regard for the distinctions in the meanings of pronominal forms, particularly, the personal pronouns which give the most trouble, as a rule ; (5) he must learn to say "No" in such a way that his meaning will not be mistaken ; (6) he must master the formula for questions ; and lastly, and perhaps most difficult of all, (7) his knowledge of the meanings of the words he uses must grow more exact.

Now some of these abilities are acquired with great ease and at once, without going through a long, tedious

preliminary practice. For example, the English formula for questions seems to fit precisely the questioning state of the young inquirer's mind. This seemed true, at any rate, of the child whom I have studied most. His first questions were as correct, grammatically, as they were after months of practice in questioning. To be sure, there were irregularities in the arrangement of the words making up the body of a long question; but the interrogative word was always in its proper place, at the beginning of the sentence.

On the other hand, mastery of diction continues throughout life to be a relative matter. It is an art which cannot be acquired in childhood. But the child must make a beginning. At first he gets many of his words confused. "Here" is used when he means "there"; "under," when he means "on"; "same" when he thinks "different," and so on. It goes almost without saying that in order to speak good English, the child must have a large number of acceptable words at his command, and he must be able to use them with precision.

In the paragraphs which follow, the first five requirements enumerated above will be explained more fully.

(1) *Number of words.*—The most obvious defect of the child's early sentences is that they do not contain enough words. The child is unable at first to marshal more than two words at a time, and these, if uttered

without "characteristic intonation and accompanying gesture," convey, in many instances, but little meaning, and are very puzzling to his hearers.

It is a matter of some interest to observe the law or principle which determines the selection and omission of words in a given series of these primitive sentences. To be sure, some words are never selected for the simple reason that they are not in the child's vocabulary. But, limitations of vocabulary aside, the explanation of the laconic nature of the child's early utterances is found in the fact that the child's first speech, like his mental processes, is a marvel of appropriateness and directness. If one selects twenty-five or thirty of a child's word combinations and compares them with his entire vocabulary, one is impressed with the fact that the child wastes little of his scanty resources, and that his speech goes with remarkable precision to the essential features of a given situation. As one looks through these primitive sentences, knowing at the same time the child's meanings, purposes, wishes and so on, one sees at once that the child makes, as a rule, the best possible selection from the words at his command to express his mental states. The explanation of this is clear, if it is remembered that the apex of the situation, the most vivid, the most intense part of the mental content of a given moment selects its appropriate verbal associate, or verbal expression. Each

vivid idea selects inevitably, within the limits of a small vocabulary, the best combination for its expression.

These principles may be illustrated from R.'s early sentence forms. In the last weeks of the second year, the child was greatly pleased by one's reading the Mother Goose jingle containing the words "the cow jumped over the moon," and he always called for the verse by crying, "wead moom." That is, from the score and a half of words composing the verse, the word "moon" was selected; first, because most of the other words were, at that time, strange to him, and he rarely used any of them; but mainly for the reason that, at that time, the moon was an object of great interest, and so immediately sprang to the center of consciousness upon hearing the verse, and, in accordance with the principle stated above, controlled the verbal expression. The same factors controlled his exclamation, or command, "no wog, foush," upon observing that a top would not spin on the rug (wog), but would run well on the bare floor (foush). And again, in the expressions "faw Dăt" when he was afraid a toy horse (Dat) would fall off the table, and in "būddah bătie," meaning, "this blanket belongs to brother." Thus it appears that there are two principles or factors which determine the composition of the child's first sentences: (1) the contents of the child's vocabulary; (2) the points or ideas which impress him most vividly.

(2) *Order of words.* — The order of words in R.'s first sentences, while sometimes topsy-turvy, if measured by English standards, was, speaking generally, the same as in adult speech, showing, no doubt, the influence of the speech of others. And in almost every case in which he changed the usual order, it would be difficult to say that the child's arrangement was illogical or equivocal. Who will say, for example, that "brother is kicking" and "the ball is gone" are more logical constructions than "kick buddah" and "ägä baw"?

The exceptions to the general rule that the order of words followed in a general way the usage of his adult companions occurred when the child was in mental excitement of some sort; for example, in great eagerness about some of his plans. On these occasions, usage, the influence of example, habit, all lost their influence, and he mixed the components of his sentences in every possible way. For example, on one occasion (twenty-fifth month) he was very anxious that his brother's doll should have something to eat, expressing his desire first by, "buddah dōi bētie" (food). Then when the food was not forthcoming at once, he began to dance and cry, "doi betie," "betie buddah doi," "doi buddah" and so on. Another striking instance of departure from the adult order of words appeared in his placing "No" at the beginning of his sentences expressing negation. This peculiarity of word arrangement will be illustrated in a later paragraph.

(3) *Inflection*.—Sully commends the young learner's efforts to smooth out the eccentricities of standard English, praises his originality, and his flagrant disregard of the conventional irregularities of English inflection, and maintains that in his blunders the young adventurer "shows a truly grammatical feeling for the general types or norms of language." But the children have not been able to effect a reform, and so each generation of English-speaking children must run the gauntlet of these irregularities, must learn the ways around these pitfalls, or be set down for illiterates. Their greatest difficulty, no doubt, is with the irregular tense forms. They must learn that, "I seed" will not do for, "I saw," and that, "have sawed" will not be accepted even in the primary grades for "have seen."¹ Next in order of difficulty is *Number*. The child must learn that the plural of man is not "mans," but men; of foot, feet, not foots. Children also have more or less trouble in learning the rules governing the agreement of verbs and their subjects in person and number. For example, the child, as a rule, uses "is" before "are"; in fact "are" is a rather late acquisition, so we hear "mans is," "books is," "whē

¹ As I look through R.'s early sentences, I fail to find many blunders in the management of tense forms. This class of errors belongs, I think, to a stage not reached by this record, perhaps the fourth and fifth years. Careful training no doubt will help a child to master these forms early. More effective still is the copy which the child hears. He gets control of inflection mainly through copying the forms he hears.

mices is?" and so on. Further difficulty is met with such distinctions as, "I run," "he runs." The child fails to see the difference, and so says "I runs."

(4) *Pronouns.*—The irregularities of the personal pronouns¹ present a peculiar set of difficulties to the child learning our language. Every one knows the street urchin's reply to the stranger's suggestion, "Run home, your mother is calling you!"—

"Her ain't a callin' we,
Us don't belong to she."

It seems highly probable that the child acquires the correct use of the personal pronouns largely through imitation. For example, the Preyer boy's "Bitte gib mir brod" (please give me bread), very likely, was a reproduction of a sentence he had often heard. The child R.'s use of "I," "itself," "himself," "it," the only forms of the personal pronoun which I am sure he used prior to the fourth year, belonged, mainly, to the mechanical, imitative class of expressions. And yet not wholly; *e.g.*, the use of the personal "I"² was due in some in-

¹The relative and interrogative pronouns may be left out of account here for the reason that the former are not used until long after the close of the period now under review, and the interrogatives offer no special difficulty.

²The personal pronoun "I" or "a"—or a sound half way between the long I and the short a—was heard an even dozen times during the latter part of R.'s third year; five times followed by "see," as "I see pigs"; four times, by "know," as "I know some"; twice followed by

stances, so it seemed, to a kind of confusion of himself with other persons whom he heard saying, "I see so and so," "I know so and so" and the like.

The suggestion that sometimes the child's use of "I" was due to confusion of himself and other persons came from R.'s answer to my question, Where is I? which he answered first by touching his eye, then by crying "papa." That is, when the child heard the sound I, he thought either of the eye, the sense organ, or the name "I" which he had heard others use when referring to themselves. Thus, "papa" was one name for a certain individual, "I" was another name for the same individual. Further, the child undoubtedly dwells much in the actions and the sayings of those about him; and it does not seem improbable that with his small knowledge of persons as separate and distinct centers of energy—indeed, with no thought at all about the matter—occasionally he should think or image so vividly what he hears others saying or sees them doing that his own personality should become obscured by his vivid images of another person's activities, and that he, in imagination, should become

"will," as "I will"; and once by "dot know," *i.e.*, I do not know. The "I will" was spoken in reply to the request, "Wait until I come back"; the "I dot know" was said in answer to the question, Who was crying? The other nine instances of the use of "I" were without reference to what others said. The "I" seemed to take the place of "Wa" and "Wadu"—his name for himself—for the moment, and, so far as one could tell, without any reason for so doing.

virtually the other person, and so should use the expressions of the person into whose place he has, for the moment, drifted. He thinks himself into the things he sees others doing, and why may he not into using their expressions? In some such way, it seems to me, we may find an explanation of many of the early uses of "I." The child says "I," not because he is growing in consciousness of self as a distinct personality, but because he in imagination repeats the expressions which he hears another person use. And since, according to a well known principle, it is only one step from vivid image to motor discharge—in particular, that the road from auditory impression to vocal utterance is short and smooth—we need not be surprised that the child utters what is in his mind. So, in order to explain the child's early and correct use of "I," we need only to think of him as forming vivid images of the things he hears his elders saying, and as being imitative in a high degree.

(5) Before the appearance of articulate speech, the child expresses negation, denial, refusal, protest, and dissent by turning and shaking the head, by inarticulate cries like "N"; then, perhaps, a little later by hní ñ. A little later still, "no" is repeated over and over, "no no no," to express negation, refusal, etc. Then when the child begins to combine words into sentences, "No" finds a place in the sentence, usually at the beginning, but sometimes at the end of the sentence.

R.'s first use of "no," as a part of a sentence, was in the twenty-fifth month, in the sense of "do not," and "is not," as follows: "no wăt," meaning, do not write; "no wead," meaning, do not read; no bake, the pencil is not broken. Other uses of "no," during the next six months, were: "no bed," I do not want to go to bed; no, hōd, I cannot, it is too hard; no ope, shut the knife; no ope doah, I did not open the door; no home, I do not want to go home; no see buddah, I do not want brother to have the toy; no tāi, I shall not tear the paper; no kwīn boke, the string will not break; no lū M., M. says I do not love her. In the list just quoted are simple negatives, requests to do so and so, requests not to do certain things, refusals, denials, and a promise not to do a certain thing. "No" is thus seen to have been of vast service in piecing out the child's limited vocabulary, and in giving meaning to his abbreviated sentence forms. At the close of the period covered by these notes, "No" still took its place at the beginning of the sentence, and was still used in the varied ways just described.¹

¹ It is interesting to note the points of similarity between the evolution of the articulate sentence and the gradual development of the child's ability to trace with pencil and paper his mental images. First, both forms of expression, drawing and sentence making, can be traced back to aimless play activities — to prelinguistic babbling, in the one case, to purposeless scribbling, in the other. In the second place, the child's primitive sentences, like his early drawings are defective in the enumeration of parts;

Table based on the record of R.'s speech illustrating the development of the sentence. (Cf. Mrs. Moore, Op. cit., p. 145.)

<i>Month.</i>	<i>The Sentence.</i>	<i>Its Meaning.</i>
24th.	Gash faw,	The glass fell, or falls.
	Wawee det,	I want some dates.
25th.	kick buddah,	brother is kicking.
	wead moom,	read more about the cow jumping over the moon.
	no wôg, souh,	spin the top on the floor, not on the rug.
26th.	ägä Dahaw,	as he covered a picture of "Grandpa."
	no, hod,	I cannot shut the door, too hard.
	puttah Wawee,	R. wants the pencil.
	pettie bed,	put the paper on the bed.
27th.	buddah-nass-dess,	this is brother's nice dress.
	buddah kwy,	brother is crying.
	wat pedie,	I want the pencil to write.
	dasis on,	put on your glasses.
28th.	no ope doah,	I did not open the door.
	nass chai,	nice chair (after he had dusted it).
	betie, Dat (Jack),	wants some food for his toy horse Jack.
	no see buddah,	doesn't want his brother to have a certain toy.
29th.	no hut fowu,	I will not hurt the flower.
	in mamma oom	
	fowu,	the flower is in mamma's room.
	uh ki bed,	I want the other kind of bread.
	moah two high,	toss the two balls high again.
30th.	fo in du wätu,	as he tossed a stone in the water.
	no wash face,	don't wash my face.
	no Buddah, fin-	brother, do not touch the stove, or you will
	nie bohn,	burn your fingers.

he does not utter enough words as he does not make enough separate parts when drawing. Thirdly, the child is careless regarding the position of words in a sentence as he is careless about the positions of parts in his drawings. One may discover, also, a certain analogy between primitive drawings and primitive speech in the defects in the inflection of speech parts and the crude representation of the several features of his drawings. Lastly, the increasing ability to distinguish meanings and to articulate more perfectly words, idioms, and sentences may be likened to the child's gradual mastery of technique in drawing along with greater power in imaging things he tries to draw.

<i>Month.</i>	<i>The Sentence.</i>	<i>Its Meaning.</i>
31st.	Komie in hauft, no kwin boke, fiss waggie, mam- ma, Waweehan fawk,	Komie is in the house. the string will not break.
32d.	buddah come out kitchis, go up chais git,	wants his mamma to fix his wagon. wants knife in his hand.
33d.	wash Wadu, Ga- ma, no Komie. papa git Wadu wud bud,	brother is coming into the kitchen. wants to go up-stairs to get a certain picture. G. is watching R. so he will not go over to Komie's.
34th.	no John walk bit now, papa caw Wadu out uh widow, mamma git book, ole King Cole in, no make John bite it,	wanted a bird which he saw.
35th.	John pill uh milk on uh table- clot, eh gass-hoppuh dig holes, put eggs in uh,	John cannot walk a bit. papa called out of the window. (meaning of this is clear).
36th.	was Wa han uh suf, tull Wa uh sins, baby tine uh git uh soap, iss like uh tsame, make good In- dian, big In- dian, fine, nice Indian,	don't let J. put the pencil in his mouth. J. spilled milk, etc. as he looked at a picture of a grasshopper de- positing eggs. wants to wash his hands himself. tell R. what these things are. baby is trying to get the soap (a picture). this card is like that one. when he wanted one to draw a picture of an Indian.

EXTENSION OF THE APPLICATION OF WORDS

A well known characteristic of the early speech of children is the tendency to give words a much wider application than is warranted by our adult standards of

meaning. This too wide application of words in naming or describing things, and in expressing wishes, is due, in some instances, to confusion, to the fact that distinctions are not seen or understood. For example R., after a visit to a menagerie in which the keeper, in order to entertain the visitors, got a hippopotamus to open its mouth very wide, said, "hippo sick in uh watuh now," the child's notion being that the hippo' was sick, and that the keeper got the animal to open its mouth in order to examine its throat, just as we had R. when we were on the lookout for diphtheritic symptoms. In other cases, the too wide use of words is due to exclusive attention to a few points of similarity and the oversight or neglect of points of difference among the things to which the same name is applied; and in still other instances to the inadequacy of the child's vocabulary. In the earlier periods, exclusive attention to the general similarity of things seen or heard, together with the fact that the child has a small vocabulary, will explain most cases of the unwarranted extension of words.

But one can never be quite sure of his ground in this field, and it is well to be cautious. To illustrate, on a certain day in his twenty-sixth month, R., glancing upward from a second-story window at which he was standing, saw coal smoke rolling out of the chimney of a near-by house, and exclaimed "choo-choo" (locomotive). Why did the child cry "choo-choo" rather than "smoke"? Of course, the child did not mistake the brick house for a locomotive. But one was in doubt

whether the sight of the column of rolling smoke revived in the child's mind an image of a locomotive. If we suppose that it did, then it would seem, at first thought, that the *resemblance* between the great column of smoke coming out of the chimney and the image of a locomotive pouring forth smoke was in the center of consciousness, and there simply was no notice of points of difference, that the child didn't stop to look at the roof, or the upper part of the house, and did just what older persons do every day — named the thing according to the aspect which struck him most forcibly. On the other hand, it is entirely possible that the child saw the differences as well as the similarities between the image and the percept, the similarity, however, having greater motor qualities, and so controlling the character of the vocal utterance. Another and simpler explanation of the child's exclamation would be to say that the only revival was the verbal expression "choo-choo" which had become closely associated with the sight of a column of smoke, there being, in fact, no part of the image of a "choo-choo" present to the child's consciousness. The further fact that "choo-choo" was easier to speak than "smoke" had some weight, perhaps, in deciding which of the two should be uttered. The difficulties of determining the mental factors in the extension of the word "choo-choo" to the column of smoke rolling out of the chimney are like those met in every attempt to explain a little child's too wide application of his words.¹

The table which follows contains a number of words, selected from R.'s speech, which came to have a much wider application than is warranted by accepted usage among adults.

¹ For a full discussion of the tendency of children to widen the application of their words, see Sully, *Studies of Childhood*, p. 161ff. On pages 167-170 will be found an interesting discussion of the process by which

Table based upon the record of R.'s speech during his second and third years, illustrating extension of application of words.

<i>The Word.</i>	<i>Its First Meaning.</i>	<i>Later Applications.</i>
Dat	a certain horse	all horses ; the head of a claw-hammer.
ägä	when he drank all of his milk	anything put out of sight ; disappearances of all kinds.
wee or wa	a rain-shower	drops of water on the walk ; puddle by the roadside ; water in pond or lake.
moom	moon	sun ; stars.
baw	ball	all roundish objects, apples, grapes, pears, eggs, a bell clapper, a squash.
tick-tick	a watch	a thermometer, a calendar.
hat	hat	an eye-shade, a lamp-shade, an inverted wooden plate, a rooster's comb.
doah	door	all gates.
tat	a cat	picture of an owl, picture of lion's head.
choo-choo	a locomotive	smoke rolling out of a chimney.
babie	baby	picture of an owl, a cast of "the laughing boy," a small monkey, all persons except adults.
fouh	floor	the ground.
dee	please sit here	put it here, I am sitting down, I want down, I'll put it on the floor.
tee	a stick	a cane, an umbrella, a ruler, a razor, a board, and all stick-like things for which he had no other name.
em	a worm	flies, ants, all small crawling insects, head of timothy grass.
mena	medicine	the contents of all bottles except the one in which he usually saw milk.
hod	toast	anything difficult or resisting, <i>e. g.</i> , when trying to lift a heavy book, or to push a door open, or when he wants one to make a <i>big</i> drawing of a horse or "choo-choo."
winia	window	a mirror.
bad	anything that hurts him	anything out of its usual place, as mud on side walk, or on his fingers.
bodye	a bird	worm on the limb of a tree, a toad hopping along on the sidewalk.
bow way	a feather which was blown for his amusement	a pigeon which flew away when he started after it.

words come to be specialized ; also, of the part which observed analogies play in the formation of language.

SUMMARY OF THE PRINCIPAL FEATURES OF R.'S SPEECH
ACTIVITIES DURING HIS SECOND AND THIRD YEARS

Thirteenth month.—In the first month of the second year, babbling continued with increasing vigor, variety, and interest. Many new syllables appeared, and the child's control of the articulatory mechanism improved rapidly. He also formed a number of new associations between words or sounds heard and objects or actions; he was becoming more imitative; and a number of associations between verbal requests on our part and certain movements on the part of the child had been formed. The latter associations had been built up, as we saw above, in much the same manner as the animal trainer gets his subjects into the habit of performing certain tricks upon receiving a given signal—a spoken word, a stroke, a pinch, a pull—what not. In the case of the child, as of the trained animal, it is a mechanical matter. The expressions—the requests—which the child hears, have no language meaning to him, at this period, except that certain movements on his part are to follow. By careful and persistent drilling, the promptness of the child's responses to verbal requests increases rapidly. There was yet no independent naming of things seen or heard, *i. e.*, no words or sounds were used to designate objects—as one hears at a later period—when, for example, the child cries “tat” at the sight of a cat, or “babie” at the sight of a small child. . . . Desire for an object was ex-

pressed regularly by an explosive "hi," and stretching the arms toward the thing he wanted.

Fifteenth month.—A great advance in the fifteenth month was in the appearance, for the first time, of the independent use of words or sounds to designate things the child saw or heard. The sight of the object or the sound which the child recognized called forth the name or word which had been associated with it. Examples were,—"ack" at the sight of a particular hat; "babee" when he saw his image in a mirror or other reflecting surface; "tī-tīt" as he held a watch to his ear.

The fifteenth month showed progress also in the number of things known by name, in understanding the simple requests of others, and in the greater definiteness of expression of his emotional states. The child repeated words spoken for him, and he spent a good deal of time in babbling to himself, repeating the same syllables over and over in a half singing tone.

The first observed instance of naming a thing which he wanted occurred in this month (447th day) when he cried "baw" (ball) then began to look around searching for the favorite plaything of that period. (As we have seen, grunting and pointing or stretching the arm toward a desired object occurred much earlier.) It was noticed also that when the child asked for a thing and was not given it at once, he threw back his head and shoulders, stiffened his back, and made a scolding sound. This is

one illustration of the general fact that the child's emotional states were coming to be expressed with more definiteness, and that his varying moods found greater facility and variety of expression.

It was noted further that the child's ability to repeat sound copies was improving rapidly, that his vocal utterances were becoming more like the copies made for him. For example, there was a marked improvement in speaking "bye-bye" and "ball." Instead of "bă-bă" the long y was sounded distinctly in "bye-bye," and in speaking "ball," bă-ī had given way to "baw."

Sixteenth month. — The first instance of "spontaneous imitation" of another's expression, which was noted, occurred in the sixteenth month, the first example being "bye-bye tat" upon hearing the words, bye-bye cat."

Eighteenth month. — Perhaps the most noticeable advances in this month, as compared with preceding months, were the increasing use of words to name things seen or heard, and the growing tendency to express his wishes by words as well as by gestures. Particularly noticeable were the increasing range and precision of his expressions of desire, and his greater skill in getting others to understand his wishes. His ability to distinguish between words spoken to him and to associate them with the proper objects was also improving rapidly. Repeating words upon request was a pleasant exercise into which he entered with spirit.

Nineteenth month. — The child's speech activities for the nineteenth month fall into the following fairly distinct classes: (1) understanding the speech of others, (2) attempts, upon request, to repeat others' words, (3) expressions of desire, (4) naming things on sight, (5) remarks, statements, exclamations, (6) spontaneous efforts to repeat others' expressions, (7) replies to questions, what is? where is? etc.

The notes for the nineteenth month contain the first references to the child's understanding and replies to questions, what is? where is? do you want? and so on. Probably there were earlier instances, but those which follow are the first of which a record was kept. The child understood that he was to try to speak the name of the object upon hearing the words, what is this, or that? Thus, when shown the face of an American silver dollar and asked, What is this? he replied, "lady-la" (a lady). When asked, Do you want some strawberries? he answered, "uh uh uh," with a forward motion of the head. If one pointed to a flower, asking, what is that? he said nothing, but inhaled deeply. (The thing that stood out prominently in connection with the sight of flowers was the way he had seen other persons act toward them — that is, smell them.)

Twentieth month. — The impression was strong during this month that the child imitated spontaneously a great many more sounds than he did two or three weeks before.

It seemed that sounds, particularly words spoken by others, served to pull the trigger of the imitative speech apparatus more frequently than formerly. But even yet the child's speech machinery was more apt to be set going by things seen than by things heard.

Sing-song babbling and voice play occupied a large place in the speech activities of the twentieth month. Many syllables, some of them names of things or persons, many others merely nonsense syllables were repeated over and over, seemingly to see how many changes could be rung on them. Thus, while playing with his wagon, he kept saying in a sing-song fashion, "wă-wă" "wă-wă." For some reason, the name "Nannie" invited a trial of his skill in speech gymnastics, and he took great pleasure in repeating the word over with every possible inflection and accent.

On a certain day, when I pointed to a strange horse and asked, "What is that?" he answered "măm" — his name for strange horses, cows, pigs, and the like. Then when I pointed to the family horse, Jack, and asked, What is that? he said "Dăt" (Jack). The word "Dat" was associated with a particular animal, while the word "mum" was associated with a class of animals for each of which he had as yet no particularizing names.

Twenty-third month. — By the beginning of the twenty-third month, the child had developed a mania for going about naming things, as if to tell others their names, or

to call our attention to the things he was examining. He would look at, point toward, or put his hand on an article, speak its name, then look at his companions. Examples: the fire, *fye*; a cast of a laughing boy, *babee*; a chair, *hai*; a kitten, *tee-tee*; the stove, *hot*; a ring, *wīn*; book, *book*; water, *wāhu*; ribbon, *ibbie*; apron, *āpie*; soap, *hoop*; mitten, *mehee*; a drum, *dud* or *dod*; a handkerchief, *hāhī*; a rattle, *wāhee*.

It was observed "that the word 'mūm' which, in the previous month, was the name he applied to all strange horses, has been displaced by the word 'Dat' (Jack, the name of the family horse). 'Dat' is now his name for *all* horses. . . . The moon, sun, stars — all are called 'moom.' 'Moom' means any bright object in the sky."

Twenty-fourth month. — The most interesting development of the last month of the second year was the appearance of expressions containing two words, sometimes as statements of fact, remarks about occurrences, as when he said, "gāsh faw" (the glass falls or fell) when some one dropped a glass on the floor, and "äga baw," *i. e.*, the ball is gone; sometimes to express requests, as when he said, "Wāhee dět" (R. wants some dates); sometimes in imitation of another's statements to him. In these expressions we have the second step in the evolution of the articulate sentence, the single word or syllable being the first step. (For fuller treatment of the development of the sentence, see page 298ff.)

A note made near the end of the month says, "the child seems to understand practically everything that is said to him, provided the remark or request relates to things or places in or around the house. One exception is to be noted,— the child does not understand the request, 'look under the table.' The word 'under' puzzles him."

On the fourth day of his twenty-fourth month, I took R. to a zoological museum to see what he would call the various animals — mounted specimens — exhibited there. A full grown moose was called "dat" (horse); pointing to its mate a few feet away, he exclaimed "moah," his word for another. A sea-lion was called "mum" and wow-wow; a hippopotamus, mum; an opossum, mum; a peccary, mum; a guinea pig, mum; a tiger, mum; an emu, chickie; a monkey, babee; arctic owls, bī (birds); bird eggs in nest, baw; snail shells, baw; a wolf, mum.

Eleven months and six days after the first visit to the museum the child made a second visit, and an effort was made to get him to name the same animals which he had named so readily and confidently on his first visit. Eleven months had wrought greatly increased power of discrimination, and greater regard for the distinguishing features of the strange things. And I found to my surprise that he refused to try to name the animals (excepting the hippo', the peccary, and the emu, which he called "pig," "pig," and "chicken" respectively) saying to my questions, What is that? "papa tull," which meant, "I don't know, you tell."

Twenty-fifth month.—Prior to the twenty-fifth month nearly all of the child's remarks were of the nature of exclamations announcing or naming, by the use of a single word, things, actions, events perceived. The present month showed a decided advance toward what sounded like real talking and the communication of facts to others, although the child's expressions were still largely spontaneous remarks regarding the things in his environment. Still, a great advance is marked by such expressions as "kick buddah" (brother is kicking), and "foo-baw böff" (the football bounced or will bounce) over the designation of objects by single words. In this month appeared the first use of "No," meaning, in requests, "do not," *e. g.*, "No home"—do not go home; and in remarks, meaning "is not," or "did not," or "will not," *e. g.*, No ope doah—I did not open the door; No hüt föwu—I will not hurt the flower.

Three things in particular marked R.'s speech of this period: (1) the order of words in a given expression was not uniform; (2) there was usually, in expressions of more than one word, a pause after each word, as in the expression "buddah kwy" (brother is crying) there was a pause after "buddah," then the word "kwy" was uttered; (3) in the enunciation of many words—but not all—there was a certain thickness and indistinctness, a sort of ragged edge which cannot be represented in print. The child's enunciation was not as distinct and clean-cut as

the spelling in this summary would indicate. The words papa, mamma, no, Wawee, and a few others were spoken as clearly and distinctly as by adults, but the rule was, a certain thickness and indistinctness.

*Thirty-third month.*¹ — The first questions appeared in the latter part of the thirty-third month, and were “ whēs ” or “ fēz John? ” and “ fēz ut ” (it)? These two expressions were heard only once each; but they were true prophets. For by the middle of the next month there were many signs that the questioning period was at hand.

Thirty-fifth month. — A note made near the end of the thirty-fifth month says, “ the child has a passion for asking ‘ whē ’ or ‘ fē ’ about almost everything he hears mentioned, things which have spatial existence and those which have not.” Of the latter were noted, — “ whēs Monday? whēs winter? whēs grand? ” It was noticed in this connection that almost any sort of an answer brought an “ Oh ” in a tone of satisfaction with the answers offered to his numerous inquiries. The interrogative “ fāt? ” (what?) was heard a few times in the latter part of this month. There was also an occasional use of “ ā ” or “ I ” meaning himself, *e. g.*, “ ā tsee cāh,” *i. e.*, I see a car.

¹ My notes for the months from the twenty-sixth to the thirty-second inclusive, contain more than eleven typewritten pages on R.’s speech activities. The headings under which the data are arranged are as follows: (1) expressions of desire, (2) naming things seen or heard, (3) remarks and observations, (4) imitative speech, (5) expressions of purpose or intention, (6) understanding others’ speech.

Thirty-sixth month. — Questioning was at high tide, so it seemed. The list of interrogatives was enlarged by the addition of "Who?" in the first week of the month and "Whī?" (which) in the second week. But at the close of the month the vast majority of his questions began with "Whē?" or "Fät?" (What?)

VOCABULARY OF THE CHILD R.

By the term "Vocabulary" as used here is meant the list of different words used independently by the child in naming things perceived, in expressing wishes or desires, in making statements of fact or purpose, or in asking questions. This definition excludes all of the child's replies to questions, as well as words and expressions which were *understood* by the child, but were not used by him. It will be understood that when one says there were so many different words used in a given period that one means that that number were heard and recorded. In order to catch every word a child uses after he begins to talk freely one would have to be with the child every one of his waking moments, and even then many words would escape notice or record. It is physically impossible for one person to hear and record all the words a child of three will utter when in a talkative mood. I have made some effort to calculate the probable percentage of words used by R. which escaped

my notice, or which, for some reason, were not recorded. As a result of these calculations, it is estimated that twenty per cent. of the words used by the child are not in the record. That is, of every one hundred different words which the child uttered the record contains only eighty. This, however, is only a rough estimate and should not be given great weight.

Table showing the number of different words noted; also the relative frequency of the various parts of speech for three different periods.

PERIOD.	Nouns.	Verbs.	Adjs.	Advs.	Pron.	Prep.	Int.	Conj.	Total.
Second Year	120	8	2	3	0	1	9	0 =	143
25th to 30th months inclusive	213	56	14	12	0	1	12	0 =	308
31st to 36th months inclusive	261	163	81	43	8	5	3	0 =	564

The percentages for the different parts of speech for the same three periods are as follows:

PERIOD.	Nouns.	Verbs.	Adjs.	Advs.	Pron.	Prep.	Int.	Conj.
Second year	83.9%	5.5%	1.3%	2.+		0.7%	6.2%	0
25th to 30th months inclusive	69.1%	18.1%	4.5%	3.8%		0.3%	3.8%	0
31st to 36th months inclusive	46.2%	28.7%	14.3%	7.6%	1.4%	0.8%	0.5%	0

Table showing by months changes in R.'s pronunciation of sixty-two words.

The Word.

Ball	ba i, 13th mo. ; baw, 15th mo. ; bä-bä, 18th mo. ; baw, 19th mo. ; ball, 32d mo.
Car	gägä, 14th mo. ; käka, 18th mo. ; cäh, 30th mo.
Hat	ack, 15th mo. ; hack, 17th mo. ; at, 19th mo. ; hat, 20th mo.
Papa	bäpä, 16th mo. ; päpä, 18th mo.
Tick tick	ti tit, 15th mo. ; tick ti, 18th mo. ; tick tick, 19th mo. ; ditit, 24th mo. ; dikok, 28th mo.
please	bease, 16th mo. ; pease, 17th mo. ; please, 34th mo.
kittie	tickie, 16th mo. ; kickie, 18th mo. ; ki ki, 20th mo. ; teetee, 23d mo. ; tittie, 29th mo. ; kiddie, 32d mo.
cat	tat, 16th mo. ; cat, 30th mo.
Jack	Yak, 17th mo. ; Gack, 18th mo. ; Dat, 20th mo. ; Jack, 29th mo.
Annie	Nannie, 17th mo. ; Annie, 20th mo.
thank you	akn or akney, 17th mo. ; äkney, 18th mo. ; käkoo, 23d mo. ; akoo, 27th mo.
my my	ma ma, 17th mo. ; ma i, 20th mo.
chickie	tick, 17th mo. ; tchick, 18th mo. ; tick tick, 20th mo. ; chick, 28th mo. ; chigie, 32d mo. ; chicken, 34th mo.
strawberry	abaw, 18th mo. ; abä, 19th mo. ; tibbie, 29th mo.
Grandma	Gä gä, 17th mo. ; Gamä, 31st mo.
shoe	schüss, 19th mo. ; choo, 27th mo. ; shoe, 30th mo.
there it is	e ti, 19th mo.
yes	yats, yesh, 19th mo. ; juss, 32d mo.
house	ouf, 19th mo. ; houf, 20th mo. ; houft, houf, 31st mo. , house, 32d mo.
clock	tlok, 19th mo. ; cock, 20th mo. ; tock, 24th mo. ; titock, 25th mo. ; cock, 34th mo. ; clock, 36th mo.
orange	on, 19th mo. ; ojoof, 28th mo.
chair	tai, 19th mo. ; chu, 32d mo. ; chai, 34th mo.
lady	ladle la, 19th mo. ; ladies, 32d mo. ; lady, 34th mo.
dress	dit, 19th mo. ; dwis, 25th mo. ; dess, 27th mo.
button	botie, 19th mo. ; butit, 20th mo.
rain	ween, 19th mo. ; wee uh, 20th mo. ; wain, 31st mo.
all gone	ägä, 19th mo. ; ga, 23d mo. ; aga, 24th mo. ; aga, 28th mo. ; gä, 29th mo. ; ägone, 31st mo.
here it is	hi tee, 19th mo. ; i ti, 20th mo. ; hi ti, 26th mo.
water	wäfit, 20th mo. ; wähu, 23d mo. ; wahaw, 24th mo. ; wähu, 27th mo. ; wätu, 30th mo.
wagon	wawa, 20th mo. ; waggie, 31st mo.
paper	pupuh, 20th mo. ; petie, 24th mo. ; pedie, 27th mo. ; petie, 35th mo.

The Word.

pencil	petie, 20th mo.; petit, 21st mo.; putie, 23d mo.; putu, 24th mo.; puduh, 31st mo.
fan	hnan, yhan, 20th mo.
cracker	tatie, 20th mo.; cackwee, 30th mo.
stocking	totiuh, 20th mo.; datie, 29th mo.; tadie, 31st mo.
hot	hok, 21st mo.; hot, 23d mo.
milk	ma, 23d mo.; muck, 24th mo.; mi man, 25th mo.; muck, 30th mo.; milk, 34th mo.
soap	hoop, 23d mo.; hope, 27th mo.; soap, 36th mo.
drum	dud, 23d mo.; gug, 25th mo.; dug, 27th mo.
Randolph	Wawee, 24th mo.; Wadoffi, 30th mo.; Wa, Wadu, 32d mo.; Wa, Wadu, 36th mo.
dollie	doih, 24th mo.; dallie, 32d mo.; dollie, 36th mo.
write	wat, 25th mo.; wite, 28th mo.
wash	wysh, 25th mo.; wäs, 35th mo.
talk	käwk, 25th mo.
cup	kuk, 25th mo.; cup, 31st mo.
smoke	moke, 25th mo.; hmake, 32d mo.
fun	whun, hoen, 25th mo.; whun, 27th mo.; funnie, 35th mo.
another	nuna, 26th mo.
Grandpa	Dahaw, 26th mo.; Gwapä, 30th mo.
glasses	dasis, 27th mo.; jasis, 29th mo.; glasses, 34th mo.
nice	nass, 27th mo.
potato	tapie or napie, 29th mo.; tapie, 31st mo.
boy	booie, 30th mo.; boy 32d mo.
things	seens, 30th mo.; sins, 32d mo.
Ruth	Woos, Whoot, Woot, 31st mo.
sand-pile	chan pa, 31st mo.; san pa, 32d mo.
sleep	tseep, 31st mo.; seet, 32d mo.; seep, 36th mo.
tell	tullu, 31st mo.; tull, 32d mo.; tell, 36th mo.
little	ittu, 31st mo.; lu, 32d mo.; litu, li, 34th mo.; lee, 36th mo.
dig	gig, 32d mo.
bird	bu, 21st mo.; bid, 23d mo.; bodie, 31st mo.; bud 33d mo.
string	kweemuh, 28th mo.; kwin, 31st mo.

Table showing the results of two tests of R.'s ability to repeat words spoken to him as copies. The tests were made in the last weeks of the thirty-first and the thirty-sixth months. (A blank means that the copy was correctly reproduced.)

The copy.	31st mo., last week.		The copy.	31st mo., last week.	
	36th mo., last week.	36th mo., last week.		36th mo., last week.	36th mo., last week.
abe			so	cho	so
ace			sell	tsoll	siah
aid		aed	zebra	zeba	zeba
a e			chair	chu	chai
afar	afä	afä	shine	chine	tsine
again	agin	agin	sure	shoou	shoou
ahoy	ahigh	ahoy	as	azt	as
ajar	ajä	ajä	epoch	ipik	epoch
ache			vex	vix	wex
ale	aluh	auh	exact	agat	eggsack
bees	beeç	beeuz	why	fye	why
crow	kwo	kwo	where	feuh	feuh
dozen	dunis	dozen	long	la	lan
Esther	Ashow	Esuh	bank	bak	bank
flow	fo	flow	then	thwin	ven or jen
gas	gas	gas	this	wiss	viss
gem			thin	fin	fin
him			throw	fo	flow
air	a i	euh	other	ullu	uzzuh
met	mit	met	snow	hnow	sone
her	hul	huh	booz	boos	boos
care	cä	cäuh	boy	booie	booie
orb	öb	öb	girl	gull	gull
use	juse	juse	slay	tay	slay
room	wum	wooum	queen	tween	queen
push	puss	puss	grass	gwass	gwass
urn	un	un	stone	tone	tone
oil	oi ih	oi ih	play	pay	play
			horse	hoss	hoss

R.'s rendering of the German verses—"Guter Mond du gehst so stille, etc." —(see below) furnishes another interesting study in the development of articulation, and in the omission of difficult letters and substitution of others for the omitted ones; also, of how letters are transposed. For rendering of the same verses by two German born children, see Preyer, *Op. cit.*, Part II, p. 236. Sigismund and Preyer used the same verses, but had the children memorize them; while in the tests which I made, the verses were repeated for R., bit by bit, the child repeating after me each bit as it was said for him as a copy. The first column below gives the verses as they were spoken; the second and third columns give the child's pronunciation of the copies, first, in the twenty-ninth month, and again in the thirty-fourth without practice on the verses in the five months which elapsed between the first and second tests.

R.		
29th month.		34th month.
Guter	goo too	goo tuh
Mond	mon	mon
du gehst	go gest	doo gase
so stille	so tillik	so tillie
Durch die	gook dee	dook dee
Abendwolken	äbuten wokoo	äben woken
hin	hin	heen
Gehst so	gehts so	gase so
traurig	wäwag	taugit
und ich	oon ich	oon ich
fühle	fühle	fühle
Dass ich	däts ich	däss ich
ohne Ruhe	ohne Woosie	ohne Woolie
bin	bin	bin
Guter	gootoo	gootuh
Mond	mon	mon
du darfst	du däfst	du däts
es wissen	a wissie	es wissen
Weil du so	wile doo so	vile doo so
verschwiegen	feegen	fefeegen
bist	bits	bist
Warum	wänum	bäoom
meine	meinit	meine
Thränen	tenit	tren
fliessen	feesit	feesen
Und mein	oon mein	oon mein
Herz so	huts so	huts so
traurig ist	tauwig its	twäig its

The Mother Goose rhyme, in which are recounted the adventures of "Little Jack Horner," R. first memorized in his thirty-second month and recited, unaided, on three different occasions as follows:—

32d month.	35th month.	Third birthday.
Littu Jack Hawnuh	Lee Jack Hawnuh	Lee Jack Hawnuh
Sit in kawnuh	Sit in uh kawnuh	Sit in uh kawnuh
Chrissy pie	Eat Christie pie	Eat uh Chrissie pie
Tuck in fum (or sum)	Tuck in uh tsum	Tuck in uh sum
Pull out pum (or Kate out sum)	Pull op uh plum	Pull out uh plum, said,
Fät good boy am I?	Fät u good boy am I?	Fät good boy am I?

Table showing the relative frequency of the various sounds as initial for two periods: (1) the second year, (2) the last half of the third year. (After Tracy, *Op. cit.*, p. 149.)

(1) Second Year.				(2) Last half of Third Year.			
21 words began with the sound of t				58 words began with the sound of k			
18	"	"	"	b	55	"	"
14	"	"	"	d	52	"	"
12	"	"	"	m	51	"	"
11	"	"	"	p	41	"	"
10	"	"	"	h	38	"	"
8	"	"	"	w	38	"	"
8	"	"	"	ä	31	"	"
7	"	"	"	g	29	"	"
6	"	"	"	f	25	"	"
6	"	"	"	k	25	"	"
5	"	"	"	a	24	"	"
3	"	"	"	i	14	"	"
3	"	"	"	n	11	"	"
3	"	"	"	e	9	"	"
2	"	"	"	ch	9	"	"
2	"	"	"	sh	9	"	"
I	"	"	"	a	7	"	"
I	"	"	"	o	7	"	"
I	"	"	"	u	6	"	"
I	"	"	"	l	5	"	"
					4	"	"
					3	"	"
					3	"	"
					3	"	"
					3	"	"
					3	"	"
					I	"	"

APPENDIXES

I. SIGHT

Coördination of eye-movements.—Many a young mother has experienced anxiety because of the unsightly behavior of her baby's eyes. One eye rolls up, the other down ; one eye turns to the right, the other to the left ; one rolls, the other remains stationary, and sometimes, as was said of Socrates', they seem to try to look into one another. No wonder the mother appeals to the doctor to know if the baby's eyes are "right." Of course, she is assured that non-coördination of eye-movements during the first few days is to be expected ; and that symmetry and coördination are acquired only gradually.

My first test to determine whether R.'s eyes would move coördinately, in following a moving object, was made when he was twenty-seven hours old by slowly moving back and forth in front of the child's eyes a small lamp held at a distance of about four feet. In this test both eyes followed the light while it moved through a distance of two feet ; then he ceased following. The coördination was pretty good, although not as good as

in normal adults. That it was accidental is suggested by the fact that coördinate movement of the eyes was not *established* until much later. An hour later, when I observed the child's eyes they were moving from right to left and up and down, but not in harmony. On the fourth day, the right eye was observed to be moving up and down while the left remained stationary. The note for the thirteenth day reads, "coördination vastly improved, but still far from perfect." We need not follow the record through day by day. On the thirty-eighth day it was noted, "that eyes move together nearly all the time." On the fifty-fifth day, one could still by careful watching occasionally see eye-movements which were asymmetrical. On the sixtieth day the note reads, "Co-ordination of eye-movements seems perfect." Thus it is seen that it was not until the end of R.'s second month that we were able to say that the eye-movements had become fully coördinated.

Sensitiveness to light.—It would be a bold imagination which should undertake to describe the effect in the mind of the newly born baby (if we may think of the child as having a mind at birth) when light waves begin to stream into his eyes. The baby's mental state may resemble our own when in the presence of a dazzling light, but it is not likely that it does. More likely it is an experience entirely different from any we know, or there may be nothing at all which could properly be

called mental. The earliest reactions of the babe to light, may be entirely reflex and unconscious.

While we cannot know the nature of the mental associates of the early reactions to light, or whether there are any such associates, we may speak of the reactions of the baby's eyes to different degrees of light intensity. The child R.'s eyelids were observed two minutes after birth to be open about two millimetres. In the dim light of the winter's evening the lids remained in that position. An hour after birth, when held so that the light of a Welsbach gas-light fell on his eyes they closed immediately and remained closed so long as he was held facing the light, but opened slightly as soon as the child's position was changed so the light did not strike his eyes directly. It was clear that his eyes were very sensitive to bright light. On the fourth and fifth days, the child's eyes were kept open in the mild light of a cloudy day. On the ninth and twentieth days I observed, what has been noticed frequently, namely, that the child's eyes were more sensitive to light just after waking. On the thirteenth day, when the child was held so that he could look at the daylight through a curtained window, his expression was decidedly more pleasant, freer, easier than when lying in his crib where the light was dim. But when the curtain was drawn to one side, his eyes partially closed and a frown appeared which seemed to mean that the brighter light was

slightly painful. This observation was repeated on the fourteenth and fifteenth days. The next observation of the child in the presence of light and brightness was on the sixty-seventh day when it was noted that he looked long and steadily at a partially shaded Welsbach gas-light. He seemed to enjoy the light, and became fretful when it was cut off from his direct vision, or when he was turned so he could not see it. Notes similar to the preceding one were made on the ninety-fifth and ninety-sixth days, the note for the latter date being, "bright objects of all kinds hold the child's eyes and seem to give pleasure."

Perception of Distance. — When does the child begin to understand that objects are distant from him? and when does he begin to perceive differences of distance? Most observers agree that the child has no idea of distance before the fifth month, though some name an earlier date and still others a much later one. Preyer, for example, says that his child in his fifty-eighth week, grasped again and again for a lamp in the ceiling of a railway carriage, and in the ninety-sixth week while standing on the ground held a piece of paper toward his father, who was looking out of a second story window, expressing the desire that his father should take the paper — a convincing proof, Preyer thought, of "how little the child appreciates distance." It should be said that the facts related by Preyer are capable of another

explanation than the one he offers. In the instance of the child's reaching for the lamp in the railway coach, the reaching may have been only an expression of desire for the bright object; and the instance of reaching the paper toward his father may have been, probably was, only a way of saying that he wished his father to have the paper, and not that he thought that his father could reach it. Probably the child did not consider the question whether or not his father could reach the proffered paper.

More reliable data concerning a child's idea of distance may be obtained by holding before him favorite toys, part of the time within reaching distance, part of the time too far away to be reached, and recording the results; that is, recording the number of times the child reaches for articles held *within* and *beyond* reaching distances. (This method cannot be used until the instinct to reach for desired objects is well established. One must also make sure that the article used is of the right kind to call forth the reaching impulse; and also that the article is not held so far away that the retinal stimulus is too weak to call forth the customary reaching reaction.)

My first use of this method was on R.'s 134th day (middle of the fifth month) by holding toys in front of him a few inches beyond his reaching distance. At that time, he invariably tried to get his hands on the toys, and cried when unsuccessful. The experiment was

repeated on the 141st day with like results. On the 146th day the child refused to reach for toys held at a distance of two feet from his breast, but did reach for them if held almost within reaching distance. On the 169th day he refused to reach for toys if the distance from his chest was eighteen inches, and his judgment of the point at which he could get his hands upon them was surprisingly good. My experiments were not carried further, but they had proceeded far enough to make it clear that by the close of the fifth month the child had acquired a few definite distance habits or ideas and further experience was all that was required to develop them.

I quote, with slight verbal changes, the following from Professor Sully's record concerning his child's perception of distance :

“When the child was just six months old the father held an object in front of him two or three inches beyond his reach. The astute little fellow made no movement. He then gradually brought it closer and when it came within his reach he held out his hand and grasped it. The experiment was repeated with slight variations until the father was satisfied that the child could distinguish with some degree of precision the near and the far, the attainable and the unattainable.”¹

Learning to look.—Professor Preyer describes four stages in the process of acquiring the ability to fixate an

¹ *Studies of Childhood*, p. 414.

object, or "look" in the sense of consciously directing the eyes by "an act of will." The first stage is that of staring into empty space. According to Preyer's view, which to the writer seems correct, all cases of apparent looking at objects during the first week are, in fact, cases of staring at objects which accidentally fall in the line of vision, and turning the head or eyes toward a light is not a "voluntary" act but an instinctive one. This, apparently, is the view of Mrs. Moore as stated on page 57 of her *Monograph*, though the statement is made on page 45 of the same work that, "at twenty-nine hours the child looked intently at a bright light." (The "looking" no doubt was what is called "staring" in Preyer's account.) My first observation of apparent fixation was made on R.'s fifth day when it was noted that the child's eyes were frequently fixed on a person's face or a lighted lamp, sometimes as long as thirty seconds at a time. Of course, these were only stares, as described above, when the eyes accidentally fell on objects within the range of vision. It was noted again on the sixth day that the child's eyes in their wandering often seemed to catch and cling to bright objects in the room.

The first or staring stage gradually passes to the *second* stage in which the child no longer seems rapt by attractive objects, but begins to choose the things he will look at. For example, Preyer's boy, on the eleventh day, looked steadily at the father's face for a minute or two, "then

turned his head toward the light, which was close by in the field of vision."¹ At this stage, the eyes and head both turn in the direction of the object. To illustrate: on R.'s sixteenth day he turned his head and eyes from the nurse's face, into which he had been gazing for ten or fifteen seconds, to a large bluish shade over a gas-fixture which, at the moment, was in the child's field of vision.

Preyer's *third* stage is reached when the child's eyes, in coördination, follow a moving object, the head remaining at rest. Observers differ widely in their reports of the earliest following movements with the eyes unaccompanied by movement of the head. According to Preyer, this stage is not reached usually, "till after many months." On the other hand, Tracy reports one case of a child's eyes following a moving object in the second week; another, on the twenty-third day. But most observers have noticed this activity first about the fifth week, some as late as the sixth or seventh. My own notes do not state when coöordinated movements of the eyes alone in following moving objects, the head being at rest, first occurred. The last observation of the matter was recorded on the thirty-seventh day when the child followed moving objects in the room—as a person—by turning both eyes and head, the eyes turning first.

Preyer's *fourth* stage is "marked by the ability, which

¹ Preyer, *Op. cit.*, Part I, p. 43.

is retained from this time forth, to direct the eyes toward an object," . . . also by seeking "untiringly for new objects when he is awake and well. This seeking, which primarily is an effort to give a definite direction to the look and hold it there, dates back to the first three months."¹ One child in the tenth week looked for the face of a person calling her; another, began to look at his hands in the sixteenth week. On the eighty-first day, Preyer's boy turned his head in the direction of a sound as if searching for its source, and when it was found held it fast. On the sixty-seventh day R. seemed to look for the source of sounds. The note under that date expresses the doubt that the child "consciously seeks the source of sounds or noises," and suggests that turning the head first in one direction, then another is only a sign of restlessness or annoyance at the noise. On the seventy-third day, I took a position to the rear and left of the child where he could not see me and spoke to him. I felt sure the child tried to turn in the direction of the sound. Then I stood in the same place and rang a small bell, and the child turned as before searching, as I believed, for the source of the sound.²

¹ Preyer, *Op. cit.*, Part I, p. 47.

² This searching for the source of sounds as here described marks the transition from the first to the second stage of infant development as described by Prof. John Dewey in a notable article printed in *The Transactions of the Illinois Society for Child Study*. According to Professor Dewey's account the essential characteristic of the first period "is the

Beginning with R.'s 265th day, I made a series of observations of the child's tendency to watch or look after objects which he had let fall or had thrown away—a matter which was closely observed by Preyer. On the day named, I noted that when he threw objects away, as if to get rid of them, he did not look after them. But if a ball with which he was playing accidentally rolled out of his reach he looked earnestly after it. On the 288th day the child threw playthings over the edge of his crib, and threw them away again and again if they were returned to him. Whether he threw the toys away because he was tired of them, or to hear them fall, or in play, one could not say. The point in this connection to note is that the child did not follow the objects with the eyes, or seem to care what became of them after he got them out of his crib. On the 300th day, R. purposely threw over the edge of his crib, balls, dolls, spools, rattles, but did not look after any of them except the ball of which he was particularly fond. He did not follow the ball while it was falling from his hands, but merely looked in the general direction it had gone, as if looking for it. At this point, my observations of the impulse to follow moving objects were discontinued.

simultaneous and relatively independent maturing of the functions corresponding to such organs as the eye, ear, etc." The second period is characterized by the coöperation of two or more functions, like seeing and hearing, which hitherto have developed in relative independence of one another. See *Illinois Transactions*, etc., Vol. IV, p. 65ff.

Movements of the eyelids.—It is well known that a threatening motion toward a baby's eyes does not cause, in the first days or weeks, blinking or winking as it does in an older child. Tracy says that in some cases the threatening motion fails to call forth the batting or winking response in children two months old. On R.'s fifth, thirteenth, nineteenth, twenty-sixth, thirty-second, and thirty-eighth days I made tests to determine the reaction of his eyes to a threatening motion of the hand toward them. It was not until the last named day that I succeeded in calling forth any reaction. On that day, the right eyelid closed slightly and feebly when I made a motion as if to strike the child in the face, but the left eyelid did not move. The following day, I repeated the experiment, but got no response. Then five days later, when I suddenly moved my hand toward the child's face, I thought there was a slight twitching, as if to close, noticeable in both eyes, but it was so faint that I was not sure. The note for the forty-ninth day reads, "Both eyes blink feebly, the right more than the left, when one makes a motion as if to strike the baby in the face." The observations of this activity were not recorded beyond the seventh week.

II. HEARING

The result of my observations and tests of the ability of the newly born baby to hear agrees with the generally

accepted belief that children are deaf at birth and remain so for a period which varies from several hours to days, or even weeks after birth. It is not easy to determine very accurately the earliest moment when sounds are first heard: first, because the child may not show, as by a start, that he hears; and second, because the start when it does appear may be due to some other cause than sounds, *e. g.*, from a jar or from air waves striking the face.

The first test of R.'s ability to hear was made when the child was twenty hours old by rapping violently on the bottom of a tin pan, held at a distance of four feet from the child's head. A screen was held in front of the child's head so as to prevent air-waves from the pan from striking his head or face. The rapping produced no visible effect whatever. Seven hours later, I struck two books together as hard as I could, but the child lay as quietly as if stone deaf. The test with the tin pan was repeated in the child's forty-fifth hour, but the rapping was not noticed. Another test was made on the third day by rapping a book sharply with a folded newspaper at a distance of three feet from the child, but the raps were entirely without effect on the child's expression. Again, on the fifth day, I rang a small breakfast bell near the child's ears, but without visible effect. Tests were made on the seventh day by ringing a bell, and by whistling near the child. Still he paid no attention. On the

fourteenth day, the child seemed to hear a small rattle when it was shaken rapidly, but the reaction was feeble, which led us to think that hearing if present at all was still very dull. On the seventeenth day, the child heard sharp hand-clapping, but did not start quickly. Finally, on the nineteenth day appeared a great leap in acuteness of hearing. While the child lay nursing, a small bell was rung gently at a distance of ten feet from him. He at once stopped nursing, held his breath, and seemed frightened. Again, in a few moments, the bell was rung and the child stopped nursing and began to cry. The ears seemed very sensitive, for the bell was not rung loudly or long at a time. From these notes it appears that R.'s hearing did not become normally acute until the third week.

Turning in the direction of sounds. — The first apparent searching for the source of a sound appeared, as we saw above, on R.'s sixty-seventh day. When I stood out of the child's sight and spoke to him he turned his head from side to side as if hunting for the sound. On the seventy-third day, I could not doubt that the child looked about searching when I stood to his left and rear and spoke to him, or rang a small bell. Again, on the 106th day it was noticed that if one stood out of his sight and spoke to him, he looked around as if searching. He did not yet turn "with the certainty of a reflex" in the direction of a sound. The turning was as if searching.

Even as late as the last day of the fourth month the child did not turn the head promptly in the direction of sounds. That ability was first noticed on the 135th day (middle of the fifth month). From that time on, he rarely was in doubt as to the direction of sounds unless the direction was obscured so that an adult would have been puzzled.

III. LEARNING TO STAND ALONE

R.'s first attempts to stand were made in the forty-sixth week (316th day) when he pulled himself up to a chair and stood in a leaning, tottering position. His eagerness to stand grew rapidly, and by the 328th day he would pull himself to a standing position by catching hold of one's clothing, or articles of furniture, or whatever would afford him a chance to pull. The standing at this time was, as the note says, "very wabbly," but it was an important practice stage in learning to stand alone. By the close of the first year the child took great delight in standing at chairs, by one's side, or by his crib, and grew fretful and restless if left sitting where he could not reach something by which he might pull himself to his feet. (The child did not creep at that time.) . . . We frequently tried to get the child to stand alone, but it was not until the *sixtieth week* that he would try to stand without support. Then, he stood unsupported two or three seconds, but was unsteady and seemed afraid of falling. He learned to stand alone rapidly, so that a note

made in the latter part of the sixty-second week reads, "the child enjoys standing alone for a few seconds at a time, and seems to think of the exercise as a play."

When one compares R.'s record with those quoted by Preyer (Vol. I, p. 269f.) it is seen that he was late in learning to stand alone. One child could get up alone in her tenth month; another stood alone in the forty-second week. "Sigismund puts the date of first attempts to stand at the eighteenth to the twenty-sixth week."

IV. LEARNING TO WALK

Walking is instinctive in the sense that the normal, healthy child comes sooner or later, and without assistance from his elders, to feel the impulse to walk. Preyer held that infants would adopt the upright position of walking even if they were removed from the suggestion or example of other human beings.

The date of the first attempts to walk varies greatly. Some children begin learning to walk as early as the eighth month; others, not until as late even as the twenty-fourth month.

There are three fairly well marked stages in learning to walk: first, when the child is led by an older person, or when he leans on something movable, a chair, *e. g.*, and pushes it in front of him; second, when the child is able to set out alone, but needs the support of articles of furniture, or the side of the room to keep from falling; third,

when the child walks about freely without support of any kind.

Record of R.'s learning to walk. — The child R. made his first attempt at walking in the forty-eighth week (331st day) when he climbed up and leaned on the seat of a rocking-chair, pushed the chair in front of him, taking awkward, straggling steps, or rather half dragged his feet as he hung in the seat of the rocker. 349th day. — The child took great pleasure in clinging to one's fingers and being led about the room, half dragging his feet, half walking. 359th day. — Previous to this date the child has not walked in the true sense; the feet and legs were rather half dragged along. Now the child is beginning to raise the feet as he moves along, clinging to articles of furniture or one's fingers for support. The whole performance looks more like real walking. 385th day. — In order to get a toy the child walked a distance of ten feet by holding to the edge of his crib and a couch. It will be noted that almost eight weeks elapsed between the first straggling walking — when supported by the rocker pushed in front of him — and walking which was self-initiated, but which still needed support. Another period of seven weeks must pass before the child will be able to move about freely, not caring for the support of furniture, or the sides of the room, or another person's hands. The steps and the rate of R.'s passing from the second to the third stage will be seen from the following

notes from the record: 385th day, — The child walks around his crib and along a couch by holding to them. 389th day, — Walks around the room by holding to furniture or by placing his hands against the wall. 415th day, — Will not try to walk or stand alone. Gets about the room by running short distances from one piece of furniture to another. 434th day, — The child takes two or three steps without support, but is afraid of falling. 445th day, — Walked about three feet without support. 448th day, — Walked about six feet unsupported. 457th day, — Walks about the house freely, falling or toppling over very rarely. 473d day, — The child climbed a half dozen steps up a flight of stairs, unaided. In brief, R. could walk alone a short distance before the end of the fifteenth month; by the middle of the sixteenth month, walking alone was well established.

V

Bodily measurements of R. and J. from birth to the end of the second year.

The height and length measurements were gotten by laying the child on a table, or the bare floor, then marking with a pencil at the head, feet, and crotch.

Child R.	Height.	Length of Body.	Weight.	Child J.	Height.	Length of Body.	Weight.
At birth.	21	in.	9 1/2 lbs.	At birth.	20 3/4	in.	14 in.
" 1 mo.			10 1/8 "	" 1 mo.	8 3/4	lbs.	9 "
" 2 mo.	22 3/4	"	15 1/4 in.	" 2 mo.			
" 3 mo.	25	"	13 1/2 "	" 3 mo.	23 1/2	"	12 3/4 "
" 4 mo.	27 3/4	"	18 "	" 4 mo.			
" 5 mo.				" 5 mo.	26 3/4	"	14 1/2 "
" 6 mo.	28	"		" 6 mo.	26 7/8	"	14 3/4 "
" 7 mo.				" 7 mo.	28	"	15 1/4 "
" 8 mo.	29 3/4	"		" 8 mo.			16 "
" 9 mo.				" 9 mo.			16 1/4 "
" 10 mo.	30 3/4	"	22 3/4 "	" 10 mo.	29 1/2	" 18 1/2	" 16 "
" 11 mo.	31 1/2	"	24 "	" 11 mo.	30 1/4	"	18 "
" 12 mo.			23 "	" 12 mo.			19 1/4 "
" 13 mo.	32 1/4	"	25 "	" 13 mo.	30 3/4	"	18 1/2 "
" 14 mo.			26 "	" 14 mo.	31 1/4	" 19 3/4	" 20 1/2 "
" 15 mo.			29 1/4 "	" 15 mo.			23 1/4 "
" 16 mo.				" 16 mo.			25 1/2 "
" 17 mo.				" 17 mo.	33 1/8	" 21 1/4	" 26 3/4 "
" 18 mo.				" 18 mo.			
" 19 mo.				" 19 mo.			30 3/4 "
" 20 mo.				" 20 mo.			
" 21 mo.				" 21 mo.			
" 22 mo.				" 22 mo.	35 1/2	" 22 1/4	" 33 "
" 23 mo.	35 1/2	" 23 1/4	" 33 1/2 "	" 23 mo.			
" 24 mo.	35 3/4	"	34 "	" 24 mo.			

HOW A ONE YEAR OLD BABY SPENT FORTY-FIVE MINUTES

Scene:— The baby seated comfortably on a rug near open door, and surrounded by playthings, including a small wooden box, two osage (hedge) apples, five green walnuts, a toy croquet mallet, a black harness ring, a small conch shell, a fruit-jar cover, a celluloid rattle, and a rubber rattle.

What the baby did in the forty-five-minutes. — Picked up the mallet; took osage apple out of the box and struck or punched it with the mallet; dropped mallet and apple; picked up the apple and threw it; picked up walnut and threw it; picked up can-lid, then ring, bit ring, threw can-lid; then put the ring in his mouth and held it there while he crawled to the lid; picked up the lid saying a; then dropped lid; bit the ring holding it first in the right hand, then the left; dropped the ring, and leaned forward on the hands and knees; picked up the can-lid; laid it down and picked up mallet with his left hand and tried to strike the lid with it; lay on his left side and made sweeping strokes at the lid; let the mallet fall and picked up a walnut; dropped the walnut and pulled the box of toys (shells and rattles) toward him; took walnut and let it fall in the box three times — apparently to hear the noise; picked up the ring and put it in his mouth; held ring in his mouth as he crawled and got two walnuts; let the ring fall; also the walnuts; picked up a stray feather; picked up a walnut and bit it; then turned the walnut over and over looking at it; threw walnut down; picked up the mallet and pounded the box; threw mallet down and crept to me, then to the door; gave the door a few swings, then crept back toward me; stopped to pull at the edge of the rug, then crept to the box; picked up mallet and threw it down; then picked it up again and pounded the box and the floor; examined the

mallet handle; let the mallet fall; picked it up with the left hand; gave his eyes a "sleepy rub" with the right hand; struck box with the mallet; dropped the mallet; pulled the box onto his lap, then pushed it away; then pulled it to his breast; set it on the floor; picked up the ring in his right hand, walnut in the left; let ring fall and picked up another walnut; dropped one walnut and held the remaining one in the left hand; looked it over, moving his lips the while, but made no sound; held the walnut in both hands; let it fall; leaned forward and got the rattle; let rattle fall; leaned over and got shell and rattle; looked at both; carried shell to mouth; dropped rattle, dropped shell, picked up walnut with left hand and put it in the right hand with an energetic movement; looked at the walnut carefully; let it fall. Then followed a performance the meaning of which I was unable to guess. The child picked up the walnut with the left hand and placed it with great care, and, apparently, with great effort, in his right hand; then he looked very seriously for two or three seconds at the empty left hand. Then he took the walnut out of the right hand and repeated the laborious process of replacing it in the right hand; then he gave the empty left hand another searching look. This was repeated nine times, but for what purpose I have no idea. He then dropped the walnut, and picked up the can-lid and tried to put it on his fingers, *i.e.*, tried to get the lid to stick on his hand as it

would on a can; fretted a little, then pitched forward on his hands, picked up the osage apple which he carried to his mouth; started quickly when I made a noise "kă" to get him to quit mouthing the apple; dropped the apple and picked up a rubber rattle, and gave it a few flourishes first with the left hand, then the right; let rattle fall and picked up mallet with left hand; dropped mallet, pitched forward and fingered the brass roller of a couch with the left forefinger; scratched the floor matting with the left forefinger; sat up; picked up can-lid with the left hand; passed it to right hand and struck the floor; let lid fall and fretted a little; leaned forward and crawled to the edge of rug which he tugged at with his left hand; sat up; fretted; picked up mallet and flourished it with the left hand, then with right; pounded floor; struck hedge-apple; picked up apple with left hand; laid it down and took mallet in the left hand, struck and rolled apple around with it; took mallet in right hand, then left; struck apple until it was out of his reach; then settled back and pounded floor; saw G. outside the door and cried to her; laughed when she called to him; laid mallet down; cried to G.; peered through the screen at her crying, ā dee, hă, hă; crawled to the screen and tried to get out, saying, ē, dee, ūh, ā; settled back and sat rubbing his eyes; fretted a little; got another glimpse of G., as she walked about the lawn, and plunged forward toward her with a joyful cry saying, "dee, ūh, ēh, eh, de, ye, ti, be, eh, it,

te, ye, te, ta, uh, ah, da, du, as G. talked to him; then laughed hard at a peek-a-boo play with his mother. When this play was over he began to fret, and was taken for his afternoon nap.



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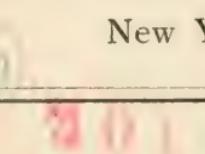
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